Three Essays on Payout Policy

Dissertation

for the Faculty of Economics, Business Administration

and Information Technology of the University Zurich

to achieve the title of

Doctor of Economics

presented by

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approved at the request of

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The Faculty of Economics, Business Administration and Information Technology of the University of Zurich hereby authorises the printing of this Doctoral Thesis, without thereby giving any opinion on the views contained therein.

Zurich, April 2, 2008

The Dean: Prof. Dr. H. P. Wehrli

Acknowledgements

I would like to thank Michel Habib, my supervisor, for his insightful advice and unfaltering support throughout the ups and downs of writing the thesis. I am also grateful to François Degeorge and Alexander Wagner, members of my doctoral committee, for their helpful and consistent feedback. I have benefitted from the useful comments of Thorsten Hens, Karen Simonyan, Jeremy Stein, René Stulz and conference and seminar participants. The usual disclaimers obviously apply and any remaining errors are of course mine. Finally, I would like to thank my colleagues in the Ph.D. program for making my doctoral years such an enjoyable experience.

Contents

Introduction

Payout policy has been an active area for research for a considerable length of time. At the same time, however, the number of unanswered questions and controversies is large, and the number of "final" answers is relatively small. The aim of this thesis is to shed some more light into the way shareholders and managers think about payout policy.

While Miller and Modigliani (1961) show that under a set of restrictions including perfect capital markets and no uncertainty the actual amount that is paid out should be irrelevant, we know that neither investors nor managers take payout decisions lightly. Indeed, one of the most robust stylized facts in this area is the significant share price reaction to the announcement of changes in dividends per share.

The traditional mainstream explanations for these significant reactions - signalling and agency - have had a mixed performance in empirical tests. This has led to an array of alternative stories accompanied by quite a few interesting empirical findings. Behavioral factors (Shefrin and Statman 1984), life-cycle hypotheses (Grullon et al. 2002), institutional clienteles (Allen et al. 2000), catering (Baker and Wurgler) are just a few of the stories that have been put forward in recent decades.

One of the striking empirical regularities uncovered by recent research is the fact that dividend changes seem to be related to past rather than future earnings growth rates (Benartzi et al. 1997). This finding has been taken as a challenge to the idea that dividend announcements have anything to say about earnings (Grullon et al. 2002, Grullon et al. 2005).

The first chapter of the thesis examines the relationship between dividends and earnings starting from a well-documented feature of dividend policy: managers' aversion to dividend cuts. The idea is that dividend cuts will only occur when managers know that the firm's earning potential has deteriorated and it is not likely to recover over the medium run. At the same time, managers will only increase dividends when they are reasonably sure that earnings have shifted to a higher level, and that level is sustainable. Thus, while dividend changes will perhaps be more closely related to past earnings growth rates, they will announce a persistent shift in earnings levels.

The hypothesis is amply and robustly supported by the data. When dividends are increased, future earnings will be at a higher level during the following few years compared to the previous ones; the opposite is true for dividend decreases. Controlling for what the market "knows" - market-to-book ratios, past profitability or past earnings growth rates - does not affect significance. If one believes in mean reversion in earnings, then it seems the speed of convergence to the mean is slower after a dividend change - especially following dividend decreases. Thus the idea that payout patterns have something to say about future

earnings appears to have practical relevance.

The relationship between dividend changes and earnings identified in the first chapter using US data is confirmed in the second chapter that deals with dividend policy in Switzerland, and this can be interpreted as a additional robustness test. The middle chapter also summarizes several other regularities that can be identified in Swiss data. Firms that pay dividends are larger, more profitable, have lower growth opportunities and lower price volatility. As in the US case, payout ratios have declined during the 1990s. Lintner's model of partial adjustment performs well only for a minority of firms.

While the empirical findings outlined in the thesis support the idea that dividends convey information to investors, they also suggest a careful interpretation of traditional signalling models, with their two-period setup and separating equilibria. Indeed, the relationship between earnings, capital expenditures and dividends suggests that "pooling equilibria" are frequent in practice, and that information is only revealed gradually.

The pooling equilibria are not surprising when one takes a closer look at the cost of signalling via dividends. The theoretical model from the third chapter of the thesis starts from the idea that the uncertainty surrounding the investment opportunities of individual firms is likely to be at least as important as that surrounding their current earnings. This additional informational asymmetry can generate higher signalling costs for high-quality firms and lead to pooling equilibria. The result is in stark contrast to the case of identical investment opportunities examined by Miller and Rock (1985).

Looking at payout and investment policy from this angle allows us to get some insight into several stylized facts identified in the recent empirical literature: "catering" and idiosyncratic risk, "disappearing" and "reappearing" dividends, and the attitude of institutional investors towards dividend-paying companies.

The main message of the empirical and theoretical work in the thesis is that dividends do indeed convey information to investors, but also that they are not a perfect signal. A proper understanding of payout policy requires a careful consideration of the costs associated with this particular information channel, of the type of firms that may find it appropriate, and of the incentives of managers and investors. It is only this type of careful analysis that can give us a reasonable forecast of the future shape of payout policy.

Chapter 1

What Do Dividends Really Say? Reconciling Old Theory and Recent Evidence

Abstract

Unlike an important series of recent papers, we find that dividends carry an important message about future earnings.

As in previous research, we find that dividend changes are better at "predicting" past rather than future earnings *growth rates*. However, we show that changes in payout have something to say about earnings *levels* over the medium run. A dividend increase indicates that average earnings will be at a higher level in the future. The converse is true in the case of dividend decreases. The finding is extremely robust.

This can be understood if we think of a very well-documented feature of payout policy: the nearly-unanimous reluctance to cut dividends. If managers cut dividends only when "they have to", and only increase them when they are sure they will not have to decrease them again in the near future, then dividend changes will be closely associated with shifts in average earnings.

We suggest that this pattern of managerial behavior can be rationalized if shareholders save on monitoring costs and rely to some extent on dividend information. Our results also warn against too literal interpretations of classical signalling models.

1.1 Introduction

Conventional business wisdom states that dividend changes are associated with changes in the future earnings power of the firm and hence with changes in firm value. Many of the mainstream theoretical papers on payout policy - such as those based on signalling - support this basic intuition. However, the recent literature on payout policy (Grullon, Michaely, Benartzi and Thaler 2005) has challenged the idea that changes in dividend payout have anything to say about the future earnings growth. Indeed, dividend changes seem to have more to say about *past* earnings growth (Benartzi, Michaely and Thaler 1997) and future risk (Grullon, Michaely and Swaminathan 2002).

This paper reconciles the two competing opinions about dividends, and puts forward a unifying story. It shows that, while dividend changes are indeed not associated with similar shifts in earnings *growth rates*, they have a significant amount to say about future earnings *levels*. Thus, for instance, a dividend increase will follow a period of high earnings growth, but it will announce that earnings will stay at a high level over the medium term. Conversely, a dividend decrease will be followed by a small rebound - but that rebound will be insufficient to bring the firm back to its previous level of earnings, and its income performance will remain modest for at least some time.

The findings of the paper can be better understood starting from the widely acknowledged managerial reluctance to cut dividends. In his classical study, Lintner (1956) found that dividend policy was characterized by "inertia and conservatism" and that "most managements sought to avoid making changes in their dividends that might have to be reversed within a year or so". More recently, Brav, Graham, Harvey, Michaely (2005) find that 94% of the managers in their survey of US financial executives say they try to avoid reducing dividends; this is the strongest result in their study. At the same time, 88% agree there are negative consequences to reducing dividends and 90% say they smooth dividends.

The paper argues that it is precisely this pattern of managerial behavior that explains a significant part of the informational content of dividends and their relationship to corporate earnings. If managers are averse to dividend cuts, one can expect that a dividend cut will be a rare occurrence - and indeed this and other studies find that dividend increases are much more frequent that dividend decreases. More importantly, dividend cuts will occur when the firm's earnings position deteriorates significantly and the past level of dividend becomes unsustainable. Therefore, when dividends are decreased, managers expect earnings to be at a lower *level* over the medium run. Moreover, managers will only increase dividends when they are reasonably sure that earnings will be high over the following periods and they will not have to reverse their decisions and reduce payout. As a result, a dividend increase will indicate that the level of earnings is likely to remain high over the medium run.

The actual data strongly support this pattern of dividends and earnings. Looking at average level of earnings before and after dividend changes reveals that the shifts in this level are closely connected with dividend changes. The average level of earnings is significantly *lower* following dividend decreases and significantly *higher* following dividend increases.

The result is quite robust. It holds whether the change in average earnings is normalized by total assets, the book or the market value of equity. It also holds when one controls for the perceived growth opportunities of each firm - as represented by market-to-book ratios - as well as past profitability and past changes in earnings. Results are similar for earnings excluding extraordinary items, net income, and cash flows.

Further empirical inquiry into the differences between dividend-increasing and dividend-decreasing firms reveals more interesting features. In the case of dividend decreases, the level of earnings during the following years will be below the level of their historical dividends for most of the firms. In contrast, the vast majority of dividend increasers will have average earnings well above the level of past or current dividends. In other words, the firms that decrease dividends are those that cannot "afford" the current level of payout any longer, while firms that increase them are reasonably sure that future earnings are sufficient to support the higher level of payout.

Fama and French (2000) and Grullon, Michaely, Benartzi and Thaler (2005) emphasize the nonlinear mean-reverting pattern in firm profitability and - to a lesser extent - in earnings levels. Firms that have experienced high profitability in the past will revert to lower levels in the future, while firms that have performed poorly will recover. This convergence will be faster following negative shocks and for larger shocks, both on the negative and positive side.

A look at the *interaction* between dividend changes and mean reversion reveals an interesting pattern. Firms that increase dividends seem to converge to the "normal" level of profitability at a slightly slower pace. The result is stronger for dividend decreases - firms seem to recover at a very weak pace, if at all, over the short term. This feature is obviously consistent with the type of managerial behavior described above. Since managers will want to make sure that the shift to a higher performance level is sustainable before they proceed to a dividend increase, firms that increase dividends will be likely to have a slower rate of convergence to the average. At the same time, dividend cuts are associated with persistent difficulties for the firm - therefore dividend cuts will be associated with slower convergence from below.

While the paper brings back the idea that dividends have something important to say about future earnings, it also confirms previous empirical findings. Indeed, the story proposed here can help accommodate apparently contradictory arguments.

In the paper mentioned above, Benartzi, Michaely and Thaler (1997) show that companies that increase dividends do not experience higher growth rates than firms that decrease them. When the dividend increase occurs, firms have already experienced higher growth - but this does not extend into the future.

The weakness of the relationship between dividend changes and future earnings *growth* is confirmed in the current sample. Dividend increases *follow* high earnings growth and dividend decreases follow growth disasters. At the same time, however, average earnings shift to a higher *level* around dividend increases and to a lower one for dividend decreases.

The two parts of the picture - the one concerning earnings growth and the one concerning

earnings levels - do fit together if one thinks of the typical managerial attitude towards dividend policy. Managers only increase dividends when they know that earnings will be persistently higher and only decrease them when companies are doing poorly. Therefore, while being of little help in terms of predicting future growth rates, dividends do provide information on future earnings levels. This feature can be useful to investors making short- and medium-term forecasts of a firm's prospects.

The findings of the paper also suggest a more careful reading of classical signalling models. Given the fact that they are generally two-period models, it may seem difficult to distinguish between earnings levels and earnings growth rates. The empirical evidence shows that dividend changes are associated with shifts in earnings levels rather than growth rates. At the same time, managers prefer to accumulate some "slack" before increasing payout, and they also seem to be running up their reserves before a dividend cut. This suggests that some residual information asymmetry is usually associated with payout policy, that some degree of pooling is the rule rather than the exception, and that the costs of communicating via dividends should not be ignored.For instance, in the classical Miller and Rock (1985) model, firms signal their higher current earnings by paying higher dividends. However, if, unlike what is assumed in the model, different firms have different investment opportunities, the result will be pooling at least among the more "similar" firms. Moreover, the result will be both forgone positive NPV projects at some times and the accumulation of slack at other times.[1] An analogous story is that where shareholders use dividends to ascertain managerial quality - since high-quality managers are likely to produce higher cash flows over time. However, if high-type managers are sometimes unlucky, they can also be fired for not producing high dividends - and this will be equivalent to the loss of positive NPV projects. Thus managers will want to set aside some cash reserves to ensure their survival, and shareholders may well allow them to do that in order to avoid excessive firing of high-quality managers.[2] The two stories - the one based purely on investment projects and that of managerial quality - are obviously related, since high-quality managers are also those more likely to get valuable investment projects.

The findings of the paper can also be related to the "maturity hypothesis" of Grullon et al. (2002). According to the maturity or life cycle story, firms that become more mature have fewer investment opportunities, more free cash flow and therefore can increase dividends. What we find in the paper is that the profile of dividend-increasing and decreasing firms does not fully support the maturity idea. Firms that increase dividends have higher growth rates for assets and sales both before and after the dividend changes. Moreover, while the growth rate of capital expenditures slows down, the average level of capital expenditures - as well as that of research and development

[1]Most of the managers in the survey by Brav et al. (2005) do not agree that investment policy is more important than dividend policy. Indeed, the statement in the paper is quite dramatic: "Today, some executives tell stories of selling assets, laying off a large number of employees, borrowing heavily, or bypassing positive NPV projects, before slaying the sacred cow by cutting dividends." The tradeoff between high dividends and high investment under asymmetric information is examined in the final chapter of the thesis.

[2]A story of "managerial conservatism" can be found in Zwiebel (1995).

expenditures - is higher after dividend increases. At the same time, the median changes in capital and R&D expenditures for dividend-decreasing firms are negative. Thus, while it may well be true that some of the firms decrease dividends in order to invest, overall dividend decreases are still bad news. This is the result one can obtain from a model where dividends are used to indicate firm quality, but there is uncertainty about the true investment opportunities of each firm.

Our results confirm Lintner's statement about management "conservatism" in terms of dividend policy. The idea of a stable target in terms of the payout ratio - the other major component of the Lintner (1956) model for dividend payments - is perhaps less successful over recent periods. Brav, Graham, Campbell and Michaely (2005) find that the performance of the Lintner model has been gradually deteriorating over the last decades. They also find that only 28% of the managers in their sample say they target payout ratios. Fama and French (1988) had already documented a large decrease in the speed of adjustment based on the Lintner model (from 49% per year in 1927-1956 to 12% per year in 1941-1986 and 11% in 1957-1986). Moreover, the case of loss-making companies poses a serious problem in terms of estimating a model based on a fixed target payout ratio - earnings can be negative, while (gross) dividends are not (Lintner's study uses *aggregate* earnings and dividends). However, while the model itself may be less useful, the intuition behind it remains largely valid.

The remaining sections of the paper are organized as follows. Section 2 contains a brief overview of the main papers in the area of dividends and earnings. Section 3 briefly describes the data used in the paper. Section 4 shows the results of the univariate analysis of earnings around dividend changes, as well as some important robustness checks and further evidence concerning the ability of firms in different groups to sustain their historical level of dividends. These are the "core" findings of the paper. Section 5 confirms the intuition of the main results in the previous section using regression analysis. It also presents preliminary results concerning the relationship between dividend changes and profitability. Section 6 discusses the findings of the paper, and Section 7 concludes. Additional results can be found in the Appendix.

1.2 The Literature on Dividends and Earnings

One of the most important stylized facts concerning dividend policy is the significant share price reaction to dividend changes (Aharony and Swary 1980, Denis, Denis and Sarin 1994, Nissim and Ziv 2001). The market seems to consider dividend increases as good news and dividend decreases as unfavorable information.

In the world of Modigliani and Miller (1961), with perfect capital markets, rational behavior and perfect certainty, dividends are irrelevant. Firms can always raise money at the appropriate cost, and investors faced with consumption shocks will always be able to get their own "homemade" dividends by selling shares. The value of the firm is given just by its investment opportunities; there is no obvious reason to have large movements in share prices following dividend announcements.

The usual explanations for the share price reactions are based on departures from this ideal framework. One idea (found for instance in Easterbrook 1984 or DeAngelo, DeAngelo and Stulz

2005) is that higher dividends help reduce the free cash flow problems. Disbursing cash prevents managers from investing in negative NPV projects that provide them with private benefits. Another classical explanation is that provided by signalling models in the tradition of Bhattacharya (1979), Miller and Rock (1985) and John and Williams (1985): dividends could be costly signals of a firm's earnings potential. The cost may come from higher taxes compared to capital gains, or from forgone investment.

The connection between dividends and earnings has been explored in several important empirical papers. In one of the older studies, Watts (1973) finds that unexpected earnings and unexpected dividends are related, but the relationship is weak and investors are unlikely to make money from exploiting this relationship. Penman (1983) compares the informational value of dividend changes and managers' earnings forecasts and finds that there is information in large dividend changes.

More recently, Benartzi, Michaely and Thaler (1997) show that there is no clear relationship between dividend changes and future earnings growth. Dividends "predict" the past rather than the future: dividend increases *follow* high earnings growth rather than announce it. Indeed, their most robust finding is that of faster earnings growth after dividend cuts. Their conclusion is that "while there is a strong past and concurrent link between earnings and dividend changes, the predictive value of dividend changes seems minimal". Grullon, Michaely and Swaminathan (2002) start from this negative finding concerning the connection between dividends and earnings growth and show instead that dividend changes are associated with shifts in risk ("If the good news in a dividend increase is not about future cash flows, then it may be about systematic risk." - p.388). Firms that increase dividends become less risky, while firms that decrease them become riskier. They argue that firms that increase dividends become more "mature" - that is, they have more stable cash flows and fewer growth opportunities. The decrease in risk is the reason for the positive share price reaction (the *maturity hypothesis*).

Guay and Harford (2000) compare dividend increases and stock repurchases. They find that, while repurchases are associated with temporary positive cash flow shocks, the group of large dividend increases is associated with more permanent shocks. The association between dividend increases and persistent increases in cash flows is confirmed by the current paper. They do not however look at the dividend decreases and the relationship between dividends and earnings.

Nissim and Ziv (2001) find that dividend changes do contain some useful information for predicting future earnings. The relationship is stronger for dividend increases, while the coefficient for dividend decreases is insignificant. Grullon, Michaely, Benartzi and Thaler (2005), however, dispute the relevance of Nissim and Ziv's finding. They argue that once one controls for the nonlinear pattern of mean reversion in earnings, the significance of the dividend indicator disappears. Their final conclusion is that investors are better off ignoring dividends.

To sum up, the idea that higher dividends are associated with higher future earnings is intuitively appealing. Nonetheless, the existing empirical evidence on this issue seems at best mixed.

1.3 Data

1.3.1 Sample and Main Variables

The paper uses data from Compustat, from both the Active and the Research files. The data in the sample covers the years 1984 through 2003. Observations concerning regulated utilities (SIC codes 4900-4949) and financial companies (SIC codes 6000-6999) are excluded from the sample. This choice is justified by the special character of the cash inflows and outflows of these companies and is current practice in the literature. A description of dividend policy in the case of banks can be found in Bessler and Nohel (2000).

The main relationship examined in the paper is that between dividend changes and changes in average earnings. The dividend change is measured as the relative change in dividends per share (Compustat item 26) between years -1 and 0 (year 0 is the year of reference):

$$Change = \frac{DPS_0 - DPS_{-1}}{DPS_{-1}}$$

In every year, firms are classified according to the type of dividend change. There are five resulting main groups:

- firms that pay no dividends following a year with positive dividends ("omissions");
- firms that decrease dividends per share ("decreases");
- firms that keep dividend unchanged from year -1 ("no change");
- firms that increase dividends ("increases");
- firms that pay positive dividends in year 0, but did not pay dividends in year -1 ("initiations/resumed payments").

Table 1.1 presents the frequency of the various types of dividend changes for each year between 1987 and 2000. The numbers presented in the table are those for companies that also have data on earnings and total assets for the years surrounding the dividend change. [3]

The first and the last groups are the least numerous - there usually are few dividend omissions and few firms that resume payments each year. Dividend increases are the largest group, and they outnumber by far the group of dividend decreases. This feature is well documented in the empirical literature on dividends (see for instance Benartzi, Michaely and Thaler 1997). It is also a finding which is obviously consistent with the managers' reluctance to reduce dividends.

Dividend changes will be compared with the changes in average earnings. For each firm-year, the latter change is defined as the difference between average earnings (income before extraordinary

[3]This is the basic sample used in the paper. Requiring information on other series will lead to - usually quite small - reductions in the sample size. The cases where the decrease in sample size are significant will be discussed in the text below.

Table 1.1: The Frequency of Dividend Changes over the 1987-2000 period

Year	Type of dividend change				
	Omissions	Decreases	No change	Increases	Initiations/ resumed payments
1987	70	107	318	704	58
1988	65	76	282	773	79
1989	75	118	272	786	80
1990	86	137	325	740	71
1991	93	165	404	619	52
1992	64	182	391	578	61
1993	68	143	384	602	57
1994	52	107	378	617	49
1995	35	92	322	655	63
1996	42	86	320	626	42
1997	41	84	311	579	41
1998	31	92	317	540	34
1999	39	102	361	471	40
2000	56	103	348	382	27
Total	817	1594	4733	8672	754

items available for common - Compustat item 237) over the three years following the dividend change and the three years preceding it, normalized by firm size. The main proxy for firm size used in the paper will be total assets; however, the change in earnings normalized by the book and the market value of equity [4] will also be used.

The main proxy for earnings used in the paper will be income before extraordinary items, since it is usually a preferred measure for a firm's core earnings potential. However, the paper will also look at changes in terms of net income and cash flows. Further analysis will also make use of market-to-book ratios, returns on assets, returns on equity [5], capital expenditures (Compustat item 128), research and development expenditures (Compustat item no. 46), and net sales (Compustat item 12).

[4]The market value of equity is computed by multiplying the number of common shares outstanding by the closing price at the end of year -1.

[5]The market-to-book ratio is computed (as in Grullon and Michaely, for instance) as the market value of equity (the closing price for the year multiplied by the number of common shares outstanding) plus total assets less the book value of common equity, divided by total assets. Returns on assets are the ratio between income before extraordinary items - available for common and total assets. Returns on equity are the ratio between income before extraordinary items - available for common and common equity (Compustat item 60).

1.3.2 Note on Data and Proxies

As in previous studies (Benartzi, Michaely and Thaler 1997, Nissim and Ziv 2001, Grullon, Michaely, Benartzi and Thaler 2005), the paper focuses mainly on the relationship between the changes in dividends per share and the changes in total earnings. For reasons discussed below, this is the reasonable choice. Nonetheless, the association between a per share measure of dividends and a measure of overall earnings may be slightly noisier than one would want it to be.

One may think of using the more "symmetric" comparison between changes in total dividends with changes in total earnings. It is important to note, however, that the use of dividends *per share* is more consistent with the research question of this paper. Since the focus is on managers' reputation concerns and their influence on dividend payouts, one should choose the most "visible" indicator of dividend policy. For all intents and purposes, this indicator is the dividend per share. [6]

The fact that dividends per share rather than total dividends are the main variable is shown by the fact that a large number of firms keep dividends per share unchanged from one year to the next. Due to small variations in the number of shares, there will be small increases and decreases in total dividends even though dividends per share are kept constant. Since the group of firms holding dividend payouts constant is used as a control group in this study, this control group will be smaller if total dividends are used. For univariate comparisons - which include some of the crucial results of the paper - this may be a drawback. In terms of regression analysis, using total dividends and total earnings may actually be helpful.

One can also think of using both dividends per share and (basic or diluted) earnings per share. While intuitively appealing, this alternative also has its drawbacks. The number of shares used to compute dividends and basic and diluted earnings per share is not the same. Moreover, there is a shift in the definition of earnings per share presented in Compustat during the period covered in the sample due to the introduction of the Statement of Financial Accounting Standards 128, which became effective in December 1997.

We present here the results based on the usual practice of employing dividends per share and total earnings. The results employing both measures in total and per share forms are similar.[7]

1.4 Univariate Results

This section of the paper examines the connection between dividend changes and changes in firm performance. The mean and median shift in earnings are computed for each type of dividend change. The resulting numbers are then compared across the various types of dividend changes. The earnings difference is also compared to zero, to check whether the average earnings of each group have increased, decreased or remained largely unchanged.

[6] Brav et al. (2005) find that 88% of the financial executives in their sample consider the level of dividends per share paid in previous periods when deciding on the current dividend payments.

[7] The alternative sets of results are available upon request. They can also be found in the Appendix B of an older version of the paper at http://ssrn.com/abstract=890740.

As mentioned above, there are five main groups of dividend changes: increases, decreases, constant dividends, omissions and initiations and resumed payments. The change in earnings is computed as the difference between the average for the three years preceding the dividend decision and the three years following it. This change is normalized by total assets or total equity.

The use of average earnings - and implicitly of a longer interval - is connected with the main focus of the paper: the connection between management behavior and the relationship between dividend changes and earnings.

In order to avoid having to reverse their decision - that is, having to cut dividends - managers will only increase payout when they are sure that the future level of earnings will be high enough to support this decision. This may mean that they are likely to allow for some interval of earnings growth to pass before they increase dividends. In other words, managers will "look back" for several years before making the decision to increase dividends per share. It is interesting to see whether managers get their forecast right - that is, whether earnings will stay at a higher level over the following years.

In the case of dividend decreases, managers will most likely try to postpone as long as possible the unfavorable decision. This will be reflected in a protracted earnings decline prior to the cut in payout. The fact that the unpleasant decision to cut dividends is taken at last should also mean that there is no substantial recovery in sight - that earnings will stay depressed over the medium term. We have seen however that previous research suggests that dividend cuts are followed by relatively high earnings growth. Thus it is seems worthwhile to check whether dividend cuts are of any help in forecasting the future path of earnings over the medium term.

Average earnings are also a better indicator of a firm's true earnings generating potential, beyond the effect of accidental factors. Moreover, using average earnings makes it more likely that any short-term "shenanigans" used by managers to adjust earnings reports are smoothed out. There is a large literature showing that managers have both the incentives and the ability to manipulate earnings numbers (an example is Degeorge, Patel and Zeckhauser 1999).

Last but not least, one should keep in mind that there really are very few standardized indicators that can be used to predict earnings over the medium term. Existing papers in the area (Ou and Penman 1989a and 1989b, Fama and French 2000) generally focus on one year ahead forecasts. The mechanism described above has implications over a longer period : earnings will stay at a relatively higher level for at least a few years; there will be no impressive recovery over the medium term.

1.4.1 The Shift in Average Earnings

The first result of the paper presents the changes in average income before extraordinary items for each type of dividend changes. This measure of earnings is less affected by transitory components and therefore provides a better picture of a firm's income generating potential.

For each firm-year, the change in earnings is defined as the difference between average earnings over the three years following the dividend change and the three years preceding it, normalized by

total assets:

$$DIFE = \frac{\frac{IBA_3+IBA_2+IBA_1}{3} - \frac{IBA_{-1}+IBA_{-2}+IBA_{-3}}{3}}{TA_{-1}},$$

where IBA is the income before extraordinary items available for common shares, and TA_{-1} represents total assets at the end of year -1, i.e. just before the dividend change. It can be seen that the earnings for year 0 (the base year) are excluded from this initial measure. Since they are the earnings *during* the year of the dividend change, it is difficult to classify them as either past or future earnings. Section 4.6 presents results for earnings indicators that include income in year 0.

Table 1.2 presents the mean and median changes in average income associated with each group. The mean and median are then compared to zero and to their counterparts for the "no change" group, which is the obvious control group. Given the problems posed by outliers and nonnormality for some of the series, median tests are more reliable than mean tests for the data used in the paper.

The results show clear differences between the types of dividend changes in terms of the shift in average earnings. The mean and median changes in average earnings are negative for dividend decreases and omissions. The changes are also significantly different from those experienced by firms in the "no change" group. Thus firms that cut dividends will have earnings that are on average *lower* than those in previous years.

Firms that increase dividends have significantly higher average earnings over the following years. The increase in average earnings is higher than that of firms in the control group. The positive shift in average earnings is significant for all quintiles of dividend increases. Moreover, one can note that the means and medians of earnings changes are increasing for the first four quintiles. The fifth quintile still has quite large mean and median increases, but they are slightly lower than those for the previous quintile. As noted in Benartzi, Michaely and Thaler (1997), the firms with the highest dividend changes are also the firms that have experienced the highest growth rates in earnings in the past (this finding also holds for the current sample). Therefore these firms are the most likely to experience a fast mean reversion along the lines of Fama and French (2000). They are also the firms that will have accumulated enough "slack" to support higher dividend payments even in the absence of high growth.

Firms that disburse cash after a year without payments also experience a significant positive shift in average earnings. Their performance is marginally better than that of the overall group of dividend increasers, but firms with the highest dividend increases seem to perform better.

Firms that kept their dividends unchanged had flat - according to the mean test - or slightly increasing - according to the median test - average earnings. The increasing trend could be associated with the high economic growth over the period.

To sum up, dividend changes seem to be quite clearly aligned with the changes in average earnings. Both the mean and the median tests imply clear differences between the groups. The differences are also highly significant for each of the 14 years.

Table 1.2: Dividend changes and changes in average earnings

The table presents the relationship between changes in dividends per share between years 0 and 1 and changes in average income before extraordinary items available to common, normalized by total assets at the end of year -1. The change in average earnings is computed as the difference between the average earnings in years 1 to 3 and years -3 to -1. Observations are grouped according to the sign and size of the change in dividends per share: omissions, renewed payments, decreases, no change and the quintiles of dividend increases. The mean and median earnings changes for each group are then compared to zero and to their counterparts from the 'no change' group. The numbers in the last five columns are the p-values for the means and medians tests.

Type of dividend changes	Number of observations	Mean	Median	Compared to 0		Compared to 'no change'		
				Mean	Sign test	Mean	Median	
							Wilcoxon	χ^2 test
Omissions	817	-0.01990	-0.00993	0.0174	0.0041	0.0000	0.0000	0.0000
Decreases	1594	-0.01060	-0.00651	0.0016	0.0001	0.0003	0.0000	0.0000
No change	4733	0.00031	0.00186	0.9809	0.0418			
Increases:								
Q1	1778	0.00713	0.00762	0.0000	0.0000	0.0024	0.0000	0.0000
Q2	1798	0.01057	0.01023	0.0000	0.0000	0.0000	0.0000	0.0000
Q3	1822	0.02194	0.02021	0.0000	0.0000	0.0000	0.0000	0.0000
Q4	1781	0.03599	0.03319	0.0000	0.0000	0.0000	0.0000	0.0000
Q5	1793	0.03439	0.02518	0.0000	0.0000	0.0000	0.0000	0.0000
Above median	4335	0.01025	0.01034	0.0000	0.0000	0.0000	0.0000	0.0000
Below median	4337	0.03336	0.02756	0.0000	0.0000	0.0000	0.0000	0.0000
All increases	8672	0.02158	0.01754	0.0000	0.0000	0.0000	0.0000	0.0000
Initiations/ resumed payments	754	0.02838	0.02700	0.0037	0.0000	0.0000	0.0000	0.0000

	Mean	Median	
		Wilcoxon test	χ^2 test
Increases vs. decreases	0.0000	0.0000	0.0000
Increases vs. initiations/resumed payments	0.1368	0.0115	0.0227

1.4.2 Net Income and Cash Flows

As mentioned before, income before extraordinary items or other indicators of "core" earnings are usually preferred since they provide a better measure of a firm's fundamental earning potential. However, our paper is concerned mainly with managerial aversion to dividend cuts as an explanation for the earnings pattern around dividend changes. If managers are concerned about having enough earnings to cover their future dividend outlays, net income rather than income excluding extraordinary items should be the relevant proxy for earnings.

Panel A of Table 1.3 shows the differences in terms of net income. Once again, the shift in the average income level is significant and positive for dividend increases and significant and negative for dividend decreases. Firms that keep dividends unchanged experience a very slight decrease in earnings. In the case of dividend omissions, the mean test suggests a more clear cut contrast than in the previous cases. As one may well expect, results are therefore even sharper when net income is used.

The previous results are based on difference in average *earnings*. It is also important to consider differences in terms of *cash flows* as well, for at least two important reasons. First, as it is often emphasized in the literature (see for instance Degeorge, Patel and Zeckhauser 1999), managers have the possibility and the incentives to manipulate earnings numbers and cash flows may provide a more accurate picture of a firm's performance. Second, dividends are paid from cash flows, and, if the managerial explanation for dividend changes is right, managers will be interested in the availability of high future cash flows rather than in accounting earnings. As in Guay and Harford (2000), cash flow from operations is defined as

$$\text{CFO} = \text{Operating income before depreciation - Interest - Taxes - } \Delta\text{Working Capital}$$

Panel B of Table 1.3 presents the results in terms of cash flows. The contrasts between the various groups are as sharp as in the previous cases. The noticeable difference is that operating cash flows around dividend decreases are flat rather than decreasing. One should keep in mind however that results refer to operating cash flows. Dividend decreases are associated with a significant negative shift in nonoperating items [8] and the situation in terms of overall cash flows available for paying dividends is therefore worse. Indeed, it is quite interesting to note that prior to the dividend change the nonoperating income of dividend decreasers is much larger than that of dividend increasers - while after the dividend change the nonoperating income of dividend increasers is slightly higher (results are available upon request). This finding suggests that the managers of underperforming firms try to find alternative or unusual sources in order to boost their earnings and cash flows and avoid dividend cuts.

[8] This is shown in Table 4 in Appendix 2.

Table 1.3: Dividend changes and changes in average net income and operating cash flows

The table presents the relationship between changes in dividends per share between years 0 and 1 and changes in net income (Panel A) and operating cash flow (Panel B), normalized by total assets at the end of year -1. The change in average earnings is computed as the difference between net income in years 1 to 3 and years -3 to -1. Observations are grouped according to the sign and size of the change in dividends per share: omissions, initiations and renewed payments, decreases, no change, increases. The mean and median earnings changes for each group are then compared to zero and to their counterparts from the 'no change' group. The numbers in the last five columns are the p-values for the means and medians tests.

Panel A. The change in average net income

Type of dividend changes	Number of observations	Mean	Median	Compared to 0		Compared to 'no change'		
				Mean	Sign test	Mean	Median	
							Wilcoxon	χ^2 test
Omissions	812	-0.02248	-0.01237	0.0089	0.0000	0.0000	0.0000	0.0000
Decreases	1586	-0.01406	-0.011215	0.0001	0.0000	0.0003	0.0000	0.0000
No change	4723	-0.00285	-0.00061	0.0313	0.5803			
Increases:	8659	0.02101	0.01768	0.0000	0.0000	0.0000	0.0000	0.0000
Initiations/ resumed payments	749	0.02788	0.02472	0.0200	0.0000	0.0000	0.0000	0.0000

	Mean	Median	
		Wilcoxon test	χ^2 test
Increases vs. decreases	0.0000	0.0000	0.0000
Increases vs. initiations/resumed payments	0.1756	0.0755	0.1015

Panel B. The change in average operating cash flows

Type of dividend changes	Number of observations	Mean	Median	Compared to 0		Compared to 'no change'		
				Mean	Sign test	Mean	Median	
							Wilcoxon	χ^2 test
Omissions	696	-0.035317	-0.018945	0.0026	0.0000	0.0000	0.0000	0.0000
Decreases	1363	0.000379	-0.001464	0.9172	0.5513	0.0000	0.0000	0.0000
No change	4156	0.017898	0.016965	0.0000	0.0000			
Increases:	7732	0.045328	0.039558	0.0000	0.0000	0.0000	0.0000	0.0000
Initiations/ resumed payments	647	0.063883	0.50530	0.0000	0.0000	0.0000	0.0000	0.0000

	Mean	Median	
		Wilcoxon test	χ^2 test
Increases vs. decreases	0.0000	0.0000	0.0000
Increases vs. initiations/resumed payments	0.0000	0.0509	0.0156

1.4.3 Earnings Ratios

It would be quite useful to be able to compare directly relative changes in dividends and relative changes in earnings - numbers would be easier to interpret and there would be no normalization problems. However, earnings can also be negative, and this obviously limits the comparison. This basic problem notwithstanding, it is interesting to have a look at relative changes for those companies that had positive earnings over the period preceding the dividend changes.

The earnings ratio is defined as

$$RATIO = \frac{IBA_1 + IBA_2 + IBA_3}{IBA_{-3} + IBA_{-2} + IBA_{-1}},$$

where the denominator has to be positive. The results for the earnings ratios around dividend changes are presented in Table 1.4.

Eliminating observations with negative past earnings obviously affects the five groups in an uneven manner - companies that omit or decrease dividends are more likely to have had a poor earnings performance in previous years. Nonetheless, results are quite telling. Companies that increase dividends experience on average a 25% increase in earnings. In the case of dividend decreases, earnings decrease by a third, while in the case of omissions earnings decrease by more than one half (the mean for omissions is obviously affected by outliers). Even in the case of companies that keep dividends constant there is a significant drop in earnings.[9]

1.4.4 Some Robustness Results

The first comparison has used average earnings normalized by total assets. The use of assets as a way to account for differences in firm size is a standard practice - as for instance in Fama and French (2001) and Grullon, Michaely and Swaminathan (2002).[10] However, the choice of a base for normalization is to some extent arbitrary and can influence results. Table 1 in the Appendix presents the results when the change in average earnings are normalized by the book and the market value of equity, respectively. [11] The overall picture is very similar regardless of the normalizing measure.

The samples used so far have also included firms that repurchase shares during year 0. It is quite possible, however, that managerial behavior and the informational content of dividend changes are different if companies also disburse cash by buying back shares. One way to avoid the

[9]It is not very surprising to find even more striking results when firms that made losses in the past are excluded, since those are the firms where managerial reputation is likely to have been damaged already. DeAngelo, DeAngelo and Skinner (1996) bring further evidence of the managers' aversion to dividend cuts in the case of firms with a long history of good performance.

[10]It is also natural to normalize other variables - such as capital expenditures, shown in Appendix 2 - by total assets rather than total equity.

[11]Nissim and Ziv (2001) and Jagannathan, Stephens and Weisbach (2000) use the value of the equity to normalize changes in earnings and dividends.

Table 1.4: Dividend changes and the ratio of average income before extraordinary items available to common

The table presents the relationship between changes in dividends per share between years 0 and 1 and the ratio between average income for years 1 to 3 and and that for years -3 to -1. Observations are grouped according to the sign and size of the change in dividends per share: omissions, renewed payments, decreases, no change increases. The mean and median earnings changes for each group are then compared to zero and to their counterparts from the 'no change' group. The numbers in the last five columns are the p-values for the means and medians tests.

Type of dividend changes	Number of observations	Mean	Median	Compared to 1		Compared to 'no change'		
				Mean	Median	Mean	Median	
							Wilcoxon	χ^2 test
Omissions	296	0.04910	0.40663	0.0000	0.0000	0.0000	0.0000	0.0000
Decreases	1072	0.63519	0.70932	0.0000	0.0000	0.0161	0.0000	0.0000
No change	3526	0.86498	0.89989	0.0000	0.0000			
Increases:	7850	1.28557	1.26634	0.0000	0.0000	0.0000	0.0000	0.0000
Initiations/ resumed payments	442	1.36037	1.25678	0.1074	0.0001	0.0015	0.0000	0.0000

	Mean	Median	
		Wilcoxon test	χ^2 test
Increases vs. decreases	0.0000	0.0000	0.0000
Increases vs. initiations/resumed payments	0.4096	0.8993	0.9221

Table 1.5: Earnings comparisons including earnings in the year of the dividend change
The table presents the mean and median changes in average earnings (normalized by total assets at the end of year -1) for the given years in the case of dividend increases and decreases. The last two columns present the results (p-values) of the tests for the equality of the mean and median earnings changes to 0.

Panel A. Years 1 to 3 compared to years -3 to 0				
Type	Mean	Median	Different from 0, mean	Different from 0, median
Dividend decreases	-0.00415	-0.00095	0.1809	0.3156
Dividend increases	0.016492	0.01439	0.0000	0.0000
Panel B. Years 1 to 3 compared to years -2 to 0				
Type	Mean	Median	Different from 0, mean	Different from 0, median
Dividend decreases	-0.000393	0.002043	0.9085	0.2485
Dividend increases	0.011266	0.010947	0.0000	0.0000

issue of additional disbursements is to use a sample of firms that did not repurchase shares in year 0 [12]. Table 2 in Appendix 1 presents the comparison between the groups of dividend changes in the absence of repurchases. The sample is smaller, with the largest reduction in the case of dividend increases. (This means that many firms that increase dividends also repurchase shares.) In spite of this, the contrasts between the various groups are again quite strong.

1.4.5 Further Evidence

The comparisons between past and future average earnings have so far omitted current earnings - earnings in the year dividends are announced. It is instructive to have a brief look at comparisons that do make use of the earnings in year 0. Table 1.5 shows comparisons that contrast average earnings for years -3 to 0 (or -2 to 0) with average earnings over the three earnings following the dividend change. The picture that emerges from these comparisons is quite interesting. The earnings of firms that decrease dividends are basically flat; the means and medians are mostly negative. There is a clear increase in earnings for dividend increases. Thus the idea that companies that increase dividends are doing better than companies that decrease them finds solid support.

Table 1.6 presents another piece of the puzzle. Panel A starts from the comparison between earnings in years 1, 2 and 3 (i.e. the years following the dividend change) and the past average earnings (average earnings for years -3 through -1). It shows the proportion of firms in each year that have earnings higher than the past average. While more than one half of firms that increased dividends have higher earnings, only slightly more than one third of the firms that decreased them will have higher earnings. The picture presented in Panel B is even more striking. The table shows the proportion of the firms in each group that has earnings above the level of total dividends paid

[12] Repurchases are defined - following Grullon and Michaely (2002) - as the difference between the Compustat items "Purchase of common and preferred stock" (Compustat item 93) and "Preferred stock redemption value" (Compustat item 56). Using just purchases of stock - as in Dittmar (2000) - results are at least as strong.

Table 1.6: Future earnings compared to past average earnings and past dividends
Panel A presents the proportion of firms that have in each particular year earnings above the average historical level (average earnings for years -3 to -1). Panel B presents the proportion of firms in each year having earnings above the level of total dividends in year -1, the year before the dividend change.

Panel A. The proportion of companies having earnings that are higher than the past average			
	Year 1	Year 2	Year 3
After dividend decreases	36.97%	37.31%	38.21%
After no changes in dividends	48.98%	47.76%	45.86%
After dividend increases	62.54%	57.50%	54.51%

Panel B. The proportion of companies that have net income higher than the total dividends announced in year -1				
	Year 0	Year 1	Year 2	Year 3
After dividend decreases	42.01%	43.49%	44.20%	41.70%
After no changes in dividends	72.55%	65.03%	60.03%	57.24%
After dividend increases	89.39%	81.60%	75.38%	70.66%

in year -1 (the "historical" level of dividends). The vast majority of dividend increasing firms will have earnings in excess of this benchmark level of dividends. The percentage is lower for firms that keep dividends unchanged, and it is well below one half in the case of dividend decreases. In other words, most of companies that decreased dividends in year 0 would have been unable to sustain the past level of dividends. This finding supports the idea that managers generally cut dividends only if they "have to".

1.4.6 Earnings Levels and Growth Rates

The results presented in this section have shown that dividend changes are associated with a corresponding shift in earnings. We have already seen however that Benartzi, Michaely and Thaler (1997) find that dividend increases do not forecast faster growth and dividend decreases predict - if anything - higher earnings growth between year 0 and year 1. It is therefore useful to check whether the previous evidence concerning earnings growth is confirmed in the current sample.

Table 1.7 presents the difference between average earnings in years 1 to 3 and earnings in year 0, normalized again by total assets at the end of year -1. We can see that firms that have increased dividends will have higher earnings in the future, but the growth in earnings relative to year 0 is much lower than that experienced by companies that have cut dividends. The overall picture obviously confirms the findings of Benartzi, Michaely and Thaler (1987).

These two results may appear contradictory at first glance and it is therefore important to understand how they actually fit together. A more detailed description of the earnings pattern around dividend changes is quite helpful for this purpose. Dividend increases follow periods of high earnings growth. They are followed by continued earnings growth, but at a slower pace compared to the previous years. Dividend decreases follow declines in profitability. (The decline actually be-

Table 1.7: Dividend changes and future earnings

The table presents the relationship between changes in dividends per share between years 0 and 1 and the difference between average earnings in years 1 to 3 and earnings in year 0, normalized by total assets. Observations are grouped according to the sign and size of the change in dividends per share: omissions, renewed payments, decreases, no change increases. The mean and median earnings changes for each group are then compared to zero and to their counterparts from the 'no change' group. The numbers in the last five columns are the p-values for the means and medians tests.

Type of dividend changes	Number of observations	Mean	Median	Compared to 0		Compared to 'no change'		
				Mean	Sign test	Mean	Median	
							Wilcoxon	χ^2 test
Omissions	814	0.010612	0.014319	0.0822	0.0000	0.0085	0.0000	0.0000
Decreases	1589	0.015195	0.012573	0.0007	0.0000	0.0000	0.0000	0.0000
No change	4725	0.000079	0.003239	0.9504	0.0000			
Increases:	8671	0.001213	0.004193	0.2321	0.0000	0.0000	0.4976	0.2257
Initiations/ resumed payments	752	-0.017252	-0.017252	0.0778	0.7985	0.0006	0.3308	0.1591

	Mean	Median	
		Wilcoxon test	χ^2 test
Increases vs. decreases	0.0000	0.0000	0.0000
Increases vs. initiations/resumed payments	0.0000	0.1747	0.0950

comes much sharper in the year of the dividend cut.) The dividend change is followed by renewed earnings growth, but this growth is insufficient to bring earnings back to their previous average level. As a result, one can see both a shift to lower average earnings and faster earnings growth after dividend decreases.

To sum up, this section has shown that when dividends change, average earnings (and cash flows) will shift in the same direction. The earnings of firms that increase dividends continue to grow, although not at the impressive speed recorded in previous years. Companies that decrease dividends will recover after the dividend change; this rebound will however be not enough to bring them to the previous level of earnings. Indeed, more than half of the firms that decrease dividends will have average earnings below their "historical" level of dividends.

This typical pattern of firm performance around dividend changes is obviously consistent with the well-known managerial attitude to dividend decisions. Since dividend cuts will have important negative effects on their reputation, managers will try to avoid them and will only reduce payout when the current level of dividends is really unsustainable. Thus dividend cuts will follow significant declines in earnings and the average level of future earnings will be below the one reached in the past. Dividend increases will follow periods of high growth and will happen when the new, higher level of earnings is sustainable.

The sharp drop in earnings noted by Benartzi, Michaely and Thaler (1997) and Grullon, Michaely and Swaminathan (2002) in year 0 [13] for dividend decreases is an interesting feature. It may be that firms that are already performing rather poorly are faced with large negative earnings shocks that force them to reduce dividends. At the same time, there may be an element of "big bath" behavior, as mentioned in Nissim and Ziv (2001). Managers may have an incentive to report lower earnings in the years with dividend cuts. These years may follow periods of "negative [earnings] savings", in the terminology of Fudenberg and Tirole (1995) - previously reported earnings were artificially high, and the year with the dividend cut is used to bring long-term earnings numbers closer to reality. A lower earnings number in the "bad" year will also increase earnings *growth* numbers for future years - while the firm will still have earnings below the past average. The average pattern of earnings around dividend changes is illustrated in Figures 1 and 2.

[13] This finding is confirmed in the current sample (results are available on request).

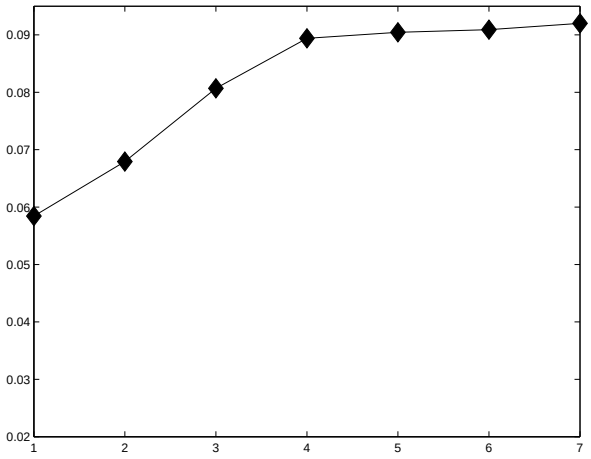

Figure 1.1: Earnings around dividend increases

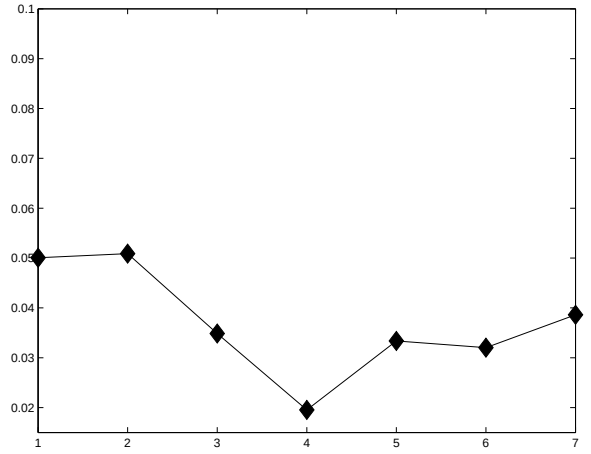

Figure 1.2: Earnings around dividend decreases

1.5 Multivariate Results

The univariate results are in a way the central findings of the paper. The central hypothesis of the paper is that managerial aversion to dividend cuts makes dividends informative about future earnings. This mechanism means that the groups of dividend increases, decreases and constant dividends are separated by "bright lines" that also help distinguish the future income patterns. Thus the clear-cut differences between these groups are the main testable result. One may also remember that the findings concerning share price reactions are also usually focused on the contrast between dividend increases and decreases.

It is important nonetheless to examine the relationship between dividend changes and changes in earnings in a regression context. This will allow us to see whether the relationship between dividends and earnings is monotonic; it will also allow us to control for other factors that can potentially influence the shift in average earnings.

The relative change in dividends is infinite in the case of firms resuming/initiating dividend payments. Therefore this group is omitted in the regression analysis. The symmetric group of dividend omissions is also excluded. The previous section has shown that firms (re)starting dividend payments are largely similar to firms that increase them. Dividend omissions are also qualitatively similar to dividend decreases.

1.5.1 Main results

Table 1.8 presents the results for the regression of the change in average earnings (normalized by total assets at the end of year -1) on dividend changes, market-to-book ratios, past earnings shifts and past profitability. Past profitability is computed as the average returns on assets during the years preceding the dividend decision (year -3 to -1). The change in dividends is defined as the relative change in dividends per share[14]:

$$Change = \frac{DPS_0 - DPS_{-1}}{DPS_{-1}}.$$

Panel A presents the results of the pooled regression. Panel B presents the results using the Fama-McBeth (1973) procedure. This method has the advantage of avoiding the heteroskedasticity problems generated by common shocks influencing the observations from individual years.

The regression results confirm the conclusions of the previous section. Changes in dividends are associated with shifts in average earnings, and this correspondence appears to be largely monotonic - larger dividend changes are associated overall with larger shifts in earnings. The fact that the constant term is significantly negative indicates the below-average performance of the firms that kept dividends unchanged.

The market-to-book ratio has a positive and significant coefficient, as expected. The change in earnings between years -3 and -1 does not have a significant impact. At the same time, past profitability is negatively related to the change in earnings, a relationship which is consistent with the idea of mean reversion in profitability in Fama and French (2000). Moreover, introducing the profitability in year 0 (that is, information that is not known at the beginning of the year dividends are changed) does not change the results (the same holds if one uses just the returns on assets in

[14]This way of defining the dividend change induces a rather peculiar shape of the distribution of dividend changes. The change is dividends will be bounded below by -1 - the change for dividend omissions. At the same time, relative increases may take very high values for a few firms. The sample used in Table 1.8 omits observations for which the growth in the dividend per share exceeds 1000% (Grullon, Michaely and Swaminathan 2002 use a threshold of 500%). This reduces the sample from 14622 to 14570, i.e. by less than 1%. Simply winsorizing at 1% and 99% produces virtually identical results, with the "loss" of more observations.

year -1 or year 0). One can also notice that the results are slightly better if one uses the Fama-McBeth procedure that reduces heteroskedasticity problems. (The results in the pooled regressions use White robust standard errors).

Table 9 presents the results using a definition for dividend changes that is more closely related to the measures of changes in average earnings. The difference in average earnings normalized by total assets, book and market equity is regressed on the difference in dividends per share divided by total assets per share, book and market equity per share respectively. The market-to-book ratio and past profitability are again used as control variables. As in the previous case, the coefficient of the market-to-book ratio is positive and significant, while the coefficient of past profitability is significant and negative.

Appendix 3 presents additional results based on *propensity score matching* (Rosenbaum and Rubin 1983). The general aim of the method is to try to establish causality while avoiding the bias induced by self-selection. The idea is to match observations in the treatment and control groups on observable characteristics so that after controlling for those distinctive features we get close to an experiment where treated and non-treated subjects are selected randomly. The interesting variables to control for are obviously those that influence both the selection into the "treatment" and "control" groups and the final outcome.

Regression analysis also includes controls. However, compared to regression analysis, propensity score matching has the additional advantage of using a common support."Treated" observations are matched to their closest counterparts in the control group, and observations that are too far to be considered comparable are excluded. Moreover, propensity score matching does not require functional form assumptions for the outcome equation.

In our case, the aim is to isolate the pure "effect" of dividend changes on earnings, while controlling for observable characteristics that may have predicted the same future firm performance. As shown in the Appendix, we find that the relationship between dividend changes and future average earnings remains robust when controlling for past profitability, market-to-book ratios, payout ratios and capital expenditures.[15]

[15]We use logit in the first stage and nearest neighbor matching. Caliper matching produces similar results for various levels of the threshold.

Table 1.8: Dividend changes and changes in average earnings

The table presents the regression of the change in average earnings (average income before extraordinary items available to common for years 1 through 3 minus the equivalent measure for years -3 to -1), normalized by total assets and the book and market value of equity, on dividend changes. I_d is a dummy variable for dividend decreases, and I_i is a dummy variable for dividend increases. *Change* is defined as the relative change in dividends per share between years -1 and 0. ROA_i stands for returns on assets in year i. The numbers in brackets are the t-test values for each coefficient. ***, ** and * stand for significance at a 1, 5 and 10% confidence level respectively.

Panel A. Pooled regressions				
Dependent variable	Change in average earnings			
Constant	-0.021758***	-0.021243***	-0.015413***	-0.018512***
	(-13.659)	(-8.109)	(-6.242)	(-7.642)
I_d * Change	0.035838***	0.034021***	0.047846***	0.047034***
	(5.973)	(4.204)	(6.211)	(5.451)
I_i*Change	0.010044***	0.009502***	0.010236***	0.10962***
	(5.459)	(4.221)	(4.793)	(4.997)
Market-to-book ratio	0.019502***	0.018978***	0.033719***	0.028336***
	(25.186)	(11.254)	(11.627)	(9.499)
$\frac{IBA_{-1}-IBA_0}{2*TA_{-1}}$		0.073117		
		(0.676559)		
$\frac{ROA_{-3}+ROA_{-2}+ROA_{-1}}{3}$			-0.004616***	
			(-6.443)	
$\frac{ROA_{-3}+ROA_{-2}+ROA_{-1}+ROA_0}{4}$				-000208***
				(-3.821)
R^2	0.049	0.050	0.095	0.090
Panel B. Fama-McBeth results				
Dependent variable	Change in average earnings			
Constant	-0.02509***	-0.02603***	-0.021154 ***	-0.022919***
	(-6.095)	(-5.920)	(-4.633)	(-5.326)
I_d * Change	0.048335***	0.041893***	0.052196***	0.05323***
	(3.941)	(3.771)	(4.842)	(4.497)
I_i*Change	0.009864***	0.009141***	0.010178***	0.011027***
	(3.601)	(3.512)	(3.777)	(3.938)
Market-to-book ratio	0.02552***	0.019388***	0.063318***	0.032615***
	(7.537)	(6.324)	(2.491)	(7.787)
$\frac{IBA_{-1}-IBA-3}{2*TA_{-1}}$		0.11682		
		(1.292)		
$\frac{ROA_{-3}+ROA_{-2}+ROA_{-1}}{3}$			-0.004875***	
			(-8.653)	
$\frac{ROA_{-3}+ROA_{-2}+ROA_{-1}+ROA_0}{4}$				-0.000208
				(-0.095)
Number of observations	14570	14570	14569	14555
R^2	0.061	0.078	0.128	0.090

Table 1.9: Regression results for different normalizing variables

The table presents the regression of the change in average earnings (average income before extraordinary items available to common for years 1 through 3 minus the equivalent measure for years -3 to -1), normalized by total assets and the book and market value of equity, on dividend changes. I_d is a dummy variable for dividend decreases, and I_i is a dummy variable for dividend increases. DPS_i are dividends per share in year i, $PCLOSE_i$ is the closing price for year i, BES_i and TAS_i represent the book value of equity and total assets per share at the end of year i. ROA_i stands for returns on assets in year i. The numbers in brackets are the t-test values for each coefficient. ***, ** and * stand for significance at a 1, 5 and 10% confidence level respectively.

Panel A. Pooled regressions			
Dependent variable	Change in average earnings normalized by		
	total assets	book value of equity	market value of equity
Constant	-0.012098***	-0.022228***	-0.002391***
	(-8.053)	(-7.381)	(-1.552)
$I_d * \frac{DPS_0-DPS_{-1}}{TAS_{-1}}$	0.730103***		
	(4.728)		
$I_i*\frac{DPS_0-DPS_{-1}}{TAS_{-1}}$	1.84315***		
	(9.185)		
$I_d * \frac{DPS_0-DPS_{-1}}{BES_{-1}}$		0.796416***	
		(4.128)	
$I_i*\frac{DPS_0-DPS_{-1}}{BES_{-1}}$		0.997410***	
		(5.749)	
$I_d * \frac{DPS_0-DPS_{-1}}{PCLOSE_{-1}}$			0.837145***
			(4.802)
$I_i*\frac{DPS_0-DPS_{-1}}{PCLOSE_{-1}}$			0.640868***
			(3.199)
Market-to-book ratio	0.033631***	0.028142***	0.005453***
	(19.647)	(15.575)	(10.061)
$\frac{ROA_{-3}+ROA_{-2}+ROA-1}{3}$	-0.003101***		
	(-14.351)		
$\frac{ROE_{-3}+ROE_{-2}+ROE-1}{3}$		-0.000260***	-0.0000787***
		(-4.212)	(-2.643)
Number of observations	14569	14459	14400
R^2	0.110	0.053	0.013

Table 9, continued: Panel B. Fama-McBeth results			
Dependent variable	Change in average earnings normalized by		
	total assets	book value of equity	market value of equity
Constant	-0.015508***	-0.020915	-0.001252
	(-4.253)	(-2.04954)	(-0.15965)
$I_d * \frac{DPS_0 - DPS_{-1}}{TAS_{-1}}$	0.881248***		
	(3.657)		
$I_i * \frac{DPS_0 - DPS_{-1}}{TAS_{-1}}$	1.525571***		
	(7.917)		
$I_d * \frac{DPS_0 - DPS_{-1}}{BES_{-1}}$		0.995733***	
		(3.773)	
$I_i * \frac{DPS_0 - DPS_{-1}}{BES_{-1}}$		1.315786***	
		(9.377)	
$I_d * \frac{DPS_0 - DPS_{-1}}{PCLOSE_{-1}}$			0.2629587***
			(4.147)
$I_i * \frac{DPS_0 - DPS_{-1}}{PCLOSE_{-1}}$			0.905545***
			(3.704)
Market-to-book ratio	0.027197***	0.036098***	0.0027539***
	(13.449)	(9.354)	(3.543)
$\frac{ROA_{-3} + ROA_{-2} + ROA_{-1}}{3}$	-0.003323***		
	(-12.257)		
$\frac{ROE_{-3} + ROE_{-2} + ROE_{-1}}{3}$		-0.002844***	-0.000221***
		(-1.914)	(-3.459)
Number of observations	14569	14459	14400
R^2	0.125	0.071	0.040

1.5.2 Dividend Changes and Mean Reversion in Earnings

The present paper is focused on the relationship between dividend changes and the average *level* of earnings. However, the main idea analyzed in the paper - that of the connection between managerial reputation concerns and dividend policy - also suggests new ways to approach the problem of dividends and firms profitability. This issue is briefly addressed in the final part of the section.

Grullon, Michaely, Benartzi and Thaler (2005) reject the idea that dividend changes are useful in predicting future profitability as suggested by Nissim and Ziv (2001). They argue that allowing for the nonlinear pattern of mean reversion in profitability emphasized by Fama and French (2001) eliminates the significance of the dividend indicator. Investors are unable to obtain better profitability forecasts by using dividend changes.

The model of Fama and French (2001) and Grullon, Michaely, Benartzi and Thaler (2005) is based on the idea that profitability is mean reverting. Firms that have been doing very well will not be unable to sustain this performance over the very long run. Firms that have been performing poorly will try to overcome their problems. The pattern of mean reversion will not be

linear, however. Firms that have experienced larger shocks will revert at a higher speed. Moreover, negative shocks will be associated with a stronger mean reversion than positive ones.

The model used in Fama and French (2001) and Grullon, Michaely, Benartzi and Thaler (2005) is

$$
\begin{aligned}
&(E_\tau - E_{\tau-1})/B_{-1} = \beta_0 + \beta_1 R\Delta DIV_0 + (\gamma_1 + \gamma_2 NFED_0 + \\
&+ \gamma_3 NFED_0 * DFE_0 + \gamma_4 PFED_0 * DFE_0) * DFE_0 + \\
&+ (\lambda_1 + \lambda_2 NCED_0 + \lambda_3 NCED_0 * CE_0 + \lambda_4 * PCED_0 * CE_0) * CE_0 + \varepsilon_\tau,
\end{aligned}
$$

where ROE_i stands for returns on assets in year i, $DFE_0 = ROE_0 - E[ROE_0]$; $CE_0 = (E_0 - E_{-1})/B_{-1}$, where E_i are earnings in year i and B_i the book value of equity in year i. $N(P)DFED_0$ are dummy variables for a negative(positive) DFE_0, and $N(P)CED_0$ are dummy variables for a negative (positive) CE_0. $R\Delta DIV_t$ is the change in dividend returns: $R\Delta DIV_t = (1 + \Delta Div_{t,1})(1 + \Delta Div_{t,2})(1 + \Delta Div_{t,3})(1 + \Delta Div_{t,4}) - 1$, where $\Delta Div_{t,i}$ is the relative change in dividends in quarter i.

Grullon, Michaely, Benartzi and Thaler (2005) compute $E[ROE_0]$ as the fitted value from a cross-sectional regression of ROE_0 on the log of assets in year -1, the log of the market-to-book ratio of equity in year -1, and ROE_{-1}. They add a dividend indicator to the model of nonlinear mean reversion and find that the indicator does not bring any useful contribution to the model.

The framework used in the analysis of dividend policy in this paper suggests another possible approach to the role of dividends in predicting future profitability. Dividend decreases tend to happen after negative earnings shocks and the following rebound in earnings is not strong enough to allow the firm to reach the previous level of earnings. Dividend increases occur after high earnings growth and the high level of earnings will not be reversed in the short run. This suggests adding the indicators for dividend changes in a different way. Rather than having a single indicator of relative dividend changes, one could add interaction terms for the mean reversion. The expected result is that the mean reversion will be weaker in the case of dividend changes. Firms that decrease dividends will have a slower rebound, while firms that increase them will be less likely to experience a fast decline.

The tables in Appendix 2 present an overview of profitability around dividend changes. It can be seen that firms that increase dividends have much higher returns on assets and on equity both before and after the dividend change. All groups of firms - except perhaps the group of companies that initiate or resume payments - show a decline in profitability after the dividend change. This decline is significantly smaller, however, after dividend increases than after dividend decreases and omissions. The overall picture implies that dividend increases follow periods of high growth rates and - as expected from previous findings - are followed by a slight decline in the pace of growth. Dividend decreases follow periods of slow growth and the pace of growth slows down considerably - rather than recover - after the dividend change.[16]

[16]The fact that earnings levels are higher while ROA declines in the case of dividend increases may seem confusing at first sight. One should remember however that firms that increase dividends are on average more

Table 1.10 shows the results for the profitability model with additional indicators for dividend changes. The regressions are estimated using the Fama-McBeth procedure. In each equation, the coefficient for the term including the indicator for dividend decreases is significant at a 5% level. The coefficient is *negative*, showing that firms that cut dividends will indeed have difficulties in reverting to the "usual" level of profitability. The result is weaker for dividend increases. The coefficients for the interaction terms are positive but insignificant. One should remember however that dividend increases follow periods of very high growth. Therefore one would expect to see a *negative* and significant coefficient - that is, faster mean reversion.

The predictions for the connection between profitability and dividend changes are largely validated by actual data. A more in-depth analysis of the relationship between dividend changes and the mean reversion in profitability could indeed be an interesting subject for further research.

To sum up the findings of this section, the relationship between dividend changes and shifts in average earnings seems to be fairly robust and quantitatively significant. Moreover, the framework used in the paper leads to some interesting preliminary findings in terms of predicting future profitability.

1.6 Discussion

As we have already seen, a series of recent papers has recently shaken the belief that dividends have anything to say about earnings. Indeed, a quest for alternative explanations for the informational content of dividends has already begun, with interesting results, such as the "maturity hypothesis" (Grullon et al. 2002).

Even papers that are more favorable to the connection between dividends and earnings are often on the defensive about some of their findings. For instance, Nissim and Ziv (2001) find that, while "dividend increases are positively related to earnings in each of the four subsequent years", "dividend decreases are not related to earnings".

We have seen that our paper is able to find a strong pattern that links dividend changes and earnings - for both dividend decreases and increases, for a long period of time and for a very large number of firms.[17] This in itself is an important result, and restores credibility to the idea that the informational value of dividends does have something to do with a firm's earnings potential. However, even more important than finding a mere pattern in earnings is understanding the story that lies behind it.

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profitable and that high profitability - as emphasized in DeAngelo, DeAngelo and Stulz (2004) - automatically leads to an increase in assets. Indeed, as shown in Table 1 and Table 2 in Appendix 2, firms that increase dividends have higher asset growth rates both before and after the dividend change. The same argument holds in terms of (book) equity and returns on equity. (Results for ROE are available upon request. They can also be found in Appendix C of the older version of the paper, at http://ssrn.com/abstract=890740.)

[17] Interestingly, the pattern is also robust across countries. See the following chapter for an illustration in the Swiss case.

Table 1.10: Dividend changes and profitability

The table presents the results based on the model in Grullon, Michaely, Benartzi and Thaler (2005). I_d is a dummy variable for dividend decreases, and I_i is a dummy variable for dividend increases. The other variables are defined in Section 5.2. The numbers in brackets are the t-test values for each coefficient. ***, ** and * stand for significance at a 1, 5 and 10% confidence level respectively.

Dependent variable	$\frac{IBA_1 - IBA_0}{BV_{-1}}$			
Constant	-0.00829	-0.00729	-0.009257	-0.00785571
	(-1.06902)	(-0.96098)	(-1.24612)	(-1.13437)
DFE	-0.000025	0.0000965	0.0005179	0.000376857
	(-0.02647)	(0.101151)	(0.580247)	(0.449013)
NDFED*DFE	-0.00385**	-0.00406**	-0.0038619**	-0.00367578*
	(-2.50224)	(-2.59217)	(-2.65143)	(-2.38083)
NDFED*DFE^2	-0.000029	-0.000015	0.00005896	0.0000081
	(-1.88623)	(2.0516)	(0.607994)	-0.7587
NDFED*DFE^2*I$_d$			-0.000205**	-0.00003174*
			(-2.27531)	(-1.9903)
PDFED*DFE^2	-0.0000076	-0.000034	-0.000037135*	-0.00003174*
	(-0.096568)	(-1.09788)	(-2.11531)	(-1.9903)
PDFED*DFE^2*I$_i$			0.00001598	0.000024427
			(0.787626)	(1.499198)
CEO	-0.14045	-0.07122	-0.1549695	-0.143662
	(-1.16651)	(-0.054303)	(-1.35363)	(-1.13388)
NCED*CEO	0.065469	0.184447	0.0760800	0.162498643
	(0.366039)	(0.971878)	(0.455722)	(0.79238)
NCED*CEO^2	0.175691	0.479454	0.1519966	0.3759725
	(0.845589)	(1.683239)	(0.714719)	(1.165502)
NCED*CEO^2*I$_d$		-0.44927*		-0.481638*
		(-1.9968)		(-1.95397)
PCED*CEO^2	-0.11199	-0.16406	-0.0703097	-0.16282
	(-1.61166)	(1.53793)	(-1.13112)	(-1.45772)
PCED*CEO^2*I$_i$		0.219958		0.1874311
		(0.824786)		(0.68799)
Number of observations				
R^2	0.352	0.368	0.369	0.379

One of the most solid stylized facts about corporate payout policy is the managers' reluctance to cut dividends. It is as persistent as the significance of share price reactions to dividend changes. It is also arguably connected with it, as we shall see below.

The study by Lintner (1956) noticed the managers' aversion to dividend decreases more than 50 years ago. Recently, in the study by Brav et al. (2005), a near-unanimity of managers says that there are "negative consequences" to cutting dividends. This is actually the strongest result in their survey.

Taking managerial aversion to dividend cuts as given, let us now proceed to explain the results in the paper. If managers do not decrease dividends until they "have to", when the dividend cut finally arrives they will have exhausted all their smoothing possibilities, the situation of the firm will be bad and there will be no radical improvement in sight. Conversely, when managers increase dividends they will make sure that they will not be forced to reverse their decision in their near future. This means that they will have to make sure that they have accumulated enough "slack" and that earnings will have shifted to a consistently higher level than in the previous years with lower dividends.

In terms of earnings *growth*, this will mean that dividend changes will predict the past rather than the future: when dividend increase eventually happens, most of the high growth has already happened. On the other side, when the dividend decrease occurs, earnings and cash flows have been already declining for some time, as the manager vainly attempted to ward off the bad news.

In terms of dividend *levels*, however, dividend changes still have something to say about the future. When a dividend cut occurs, although the decline in earnings may have been observed by investors[18], the dividend announcement will inform them that there will be no noticeable recovery in sight over the next few years. When the management decides a dividend increase, investors will know that earnings will stay at a level that is above the average in recent years. Thus a dividend increase (decrease) is still good (bad) news about future earnings.

What remains to be explained is where the managerial aversion to dividend cuts and the accumulation of "slack" come from. A good starting point here is thinking about "classical" signalling models such as Miller and Rock (1985). In that well-known model, investors are unsure about the quality of the firm's current earnings (which are in some way related to future earnings). As a result, firms that have higher current earnings will choose to pay higher dividends in order to distinguish themselves from their worse performing counterparts.

An important assumption supporting that equilibrium is that all firms have the same investment opportunities (the same production function in their model). If that is not true, firms with lower earnings *and* lower investment opportunities will find it easier to pay higher dividends than the good firms - and the signal will not work anymore.

It is obvious that firms do have different investment opportunities. Indeed, one may even be justified to think that uncertainty about investment opportunities is at least as great as that about

[18]It is interesting to remember that, as shown in the previous sections, the steepest fall in reported earnings happens *in the year of the dividend cut*. Thus earnings themselves may have been smoothed, and outside investors may have observed an earnings decline that was lower than it "should have been".

current earnings.

As a result, if investors find it difficult to extract precise information from current earnings[19], and rely on dividends instead, this will come at a price. This is because sometimes managers may choose to forgo worthwhile investment opportunities in order to maintain the share price[20]. Shareholders will therefore be wary of requiring very high dividends from the firm - although paying higher dividends has the potential of raising share prices.

Given the uncertainty about the underlying investment opportunities of the firm, managers will sometimes have some slack and at other times will do the "wrong thing" (abandon or forgo positive NPV projects) in order to maintain artificially high payout levels. While overall firms paying more over their lifetime will be more valuable, dividends and dividend changes at any given point in time will be a noisy indicator of firm quality. They will also be "smoother" than when investment opportunities are publicly known.

A story that is closely related is that where dividends are used to assess managerial quality. Firing a good, but temporarily unlucky manager is equivalent to the loss of a valuable investment opportunity. Managers will have the incentives to build up some slack, and they may well be allowed to do so for some time by shareholders wary of making wrong firing decisions.[21] It is important to note that the story based purely on investment projects is quite consistent with that based on managerial quality: high-quality managers are also more likely to get valuable investment opportunities.

Our findings are consistent with the fundamental intuition behind signalling models. However, they are also a warning against some literal interpretations of signalling models. We outline some of the potential pitfalls below.

First, since standard signalling models are two-period models, it is difficult to distinguish between earnings growth and a shift in levels. As a result, when dividend changes are found to be unrelated to future earnings growth rates, it may seem that they have nothing to say about earnings at all (Benartzi et al. 1997). Indeed, Grullon at al. (2002) take the decrease in ROA *growth rates* following dividend increases as a sign against the idea that dividends contain information about a firm's earnings potential. One should keep in mind that we are talking about something akin to growth rates of the growth rates - while dividends are more likely to have something to say about

[19]The literature on earnings management is large and well-established. See for instance Sougiannis, Li and Lev (2005).

[20]Most of the managers in the survey by Brav et al. (2005) do not agree that investment policy is more important than dividend policy. A large proportion also say that they sometimes forgo positive NPV projects to maintain dividend levels. The final chapter of the thesis formalizes the tradeoff between high current dividends and high investment.

It may be interesting to note that, while the final result in Miller and Rock (1985) is right, they have an error in their Section 1F, where the formulas seem to imply there is no cost of dividend signalling. In fact, managers in their model trade off the interests of short- and long-term shareholders, and helping one group hurts the other. It is this balance that determines the optimal amount of dividends in this type of models.

[21]The incentives for managerial "conservatism" under asymmetric information are formalized in Zwiebel (1995).

earnings *levels*.

Second, looking at the fully separating equilibria in typical signalling models may lead one to forget the fact that the cost of dividend signalling may sometimes be higher for good firms and managers. Thus one can easily forget about the potential for pooling and dismiss signalling models altogether, when their basic intuition is actually true. Since small firms are the ones faced with the worst informational asymmetries, they should do most of the signalling - and yet they are to be found among firms that do not pay dividends. If one thinks that these are exactly the firms for which investment opportunities are crucial - and difficult to assess by outsiders - this stylized fact is less surprising. Moreover, the variance in managerial quality is more likely to be high for these firms, and may well require direct monitoring rather than dividend signalling. Finally, the more concentrated ownership structure may make the rough monitoring via dividends superfluous. Thus dividend "signalling" does work in practice - but only for a minority of firms.

The findings and story presented in the paper are also consistent with the arguments of agency theories. If managers (even those with the "right" skills) are inclined to overinvest and boost their private benefits, then extracting free cash from the firm becomes necessary (see DeAngelo, DeAngelo and Stulz (2006) for a compelling story). When the investment opportunities of the firm are not exactly known by shareholders, they are again faced with the tradeoff between losing positive NPV projects as a result of excessive payout and having managers invest in negative NPV projects.[22]

Our story can also be related with the intuition behind the "maturity hypothesis" of Grullon et al. (2002). Dividend decreases can still happen even in a semipooling equilibrium when investment opportunities are high, while high dividends may well be used to disburse free cash with that has no profitable use within the firm. However, overall dividend-increasing firms may still do better than dividend-decreasing ones - and the latter group may well include failing companies that have neither high current cash flows nor good growth prospects. As shown in Appendix 2, we find that the level of capital expenditures is *higher* after a dividend increase, although their growth rate may slow down.[23] (This is also in line with the findings of Yoon and Starks 1995 and Denis, Denis and Sarin 1994). Grullon at al. (2002) themselves find that the major difference between dividend increasers and dividend decreasers in their sample is that the former have significantly higher market-to-book ratios. Thus one can find high investment and therefore high risk for *some* of the dividend decreasers, but the prospects for the *overall* group of low-dividend paying companies may still be poor.[24]

The paper has not dealt with tax issues that can affect dividend changes. To the extent that - as

[22]It may be important to note here that Miller and Modigliani (1961) mandate full payment of free cash flows, a point forcefully made by DeAngelo and DeAngelo (2006). However, over and above this important point, agency considerations may make shareholders even more willing to extract cash from their firms.

[23]This may also be taken as a warning against a too literal interpretation of agency explanations for dividends. Even though shareholders have extracted more cash from the firm, investment is not reduced.

[24]This intuition is formalized in the final chapter of the thesis.

suggested by an important branch of the literature - firms' dividend policies lead to the formation of dividend clienteles, dividend changes will affect the "usual" investors in each firm and this will lead to significant share price reactions. Moreover, taxes may make dividends a costly signal of firm quality (as shown in John and Williams 1985 and Allen, Bernardo and Welch 2000). The findings presented in the previous sections imply that share price reactions can also be generated by the information about future earnings contained in dividend changes. The two explanations are most likely complementary. It is important however to understand the reasons for share price reactions even in the absence of tax factors. Amihud and Murgia (1997) show that dividend changes in Germany in the 1990s did lead to significant price reactions during a period when dividend income was treated at least as favorably as capital gains.

1.7 Conclusions

The paper has shown that dividend increases are associated with significant positive shifts in average earnings, while dividend decreases are associated with negative changes in average earnings. In the case of dividend increases, the years of very high growth are already in the past; however, this growth is not reversed and earnings stay at a high level. In the case of dividend decreases, the dividend change follows a decline in earnings and the subsequent rebound is not enough to bring the firm back to the previous level of earnings. Moreover, firms that increase dividends will have earnings in excess of their historical payouts. This is not true, however, for the majority of dividend-decreasing firms.

The results presented in the paper bring some redeeming evidence for the idea that dividends can be helpful in forecasting future earnings. This is important in light of the existing literature on dividends, particularly for the case of dividend decreases.

The patterns described above also point to the managers' aversion to dividend cuts, documented in Brav, Graham, Harvey and Michaely (2005), as an important determinant of the relationship between dividends and earnings. Managers will only increase dividends when they are sure that earnings have shifted to a higher level for the medium term. They will also only decrease dividends when they are forced to do so because of persistently low earnings.

This behavior of firm managers can therefore be helpful in explaining the share price reactions to dividend changes, since it ties shifts in cash disbursements to shifts in the earning potential of the firm. Investors actually get some information on future earnings from dividend changes, and this may help them save on monitoring costs. At the same time, however, the excessive attention paid by managers to dividend numbers may lead to the accumulation of unnecessary "slack" or, conversely, to the rejection of some positive NPV projects. The analysis of managers' discretion over payout policy from both an empirical and a theoretical point of view is certainly an interesting area for future research.

1.1 Appendix

1.1.1 Selected Robustness Results

Table 1.1: Dividend changes and changes in average earnings normalized by the book and market value of equity

The table presents the relationship between changes in dividends per share between years 0 and 1 and changes in net, normalized by the book (Panel A) and the market (Panel B) value of equity at the end of year -1. The change in average earnings is computed as the difference between income before extraordinary items in years 1 to 3 and years -3 to -1. Observations are grouped according to the sign and size of the change in dividends per share: omissions, decreases, no change, increases, and initiations/resumed dividend payments. The mean and median earnings changes for each group are then compared to zero and to their counterparts from the 'no change' group. The numbers in the last five columns are the p-values for the means and medians tests.

Panel A.The change in average earnings normalized by the book value of equity

Type of dividend changes	Number of observations	Mean	Median	Compared to 0		Compared to 'no change'		
				Mean	Sign test	Mean	Median	
							Wilcoxon	χ^2 test
Omissions	809	-0.08337	-0.01814	0.2012	0.0138	0.0076	0.0010	0.0027
Decreases	1585	-0.04295	-0.01759	0.0744	0.0001	0.0000	0.0000	0.0000
No change	4730	0.00244	0.00410	0.7362	0.0607			
Increases:	8663	0.04390	0.03844	0.0000	0.0000	0.0000	0.0000	0.0000
Initiations/ resumed payments	754	0.77186	0.05336	0.2984	0.0000	0.0009	0.0000	0.0000

	Mean	Median	
		Wilcoxon test	χ^2 test
Increases vs. decreases	0.0000	0.0000	0.0000
Increases vs. initiations/resumed payments	0.0001	0.1019	0.0942

Panel B.The change in average earnings normalized by the market value of equity

Type of dividend changes	Number of observations	Mean	Median	Compared to 0		Compared to 'no change'		
				Mean	Sign test	Mean	Median	
							Wilcoxon	χ^2 test
Omissions	782	-3.6759	-0.01563	0.5532	0.0090	0.1476	0.0150	0.0020
Decreases	1487	-0.03380	-0.01535	0.0000	0.0000	0.0030	0.0000	0.0000
No change	4673	-0.00636	-0.00217	0.0021	0.0611			
Increases:	8472	0.01204	0.01532	0.0000	0.0000	0.0000	0.0000	0.0000
Initiations/ resumed payments	706	0.05057	0.02769	0.0000	0.0000	0.0000	0.0000	0.0000

	Mean	Median	
		Wilcoxon test	χ^2 test
Increases vs. decreases	0.0000	0.0000	0.0000
Increases vs. initiations/resumed payments	0.0000	0.0001	0.0001

Table 1.2: Dividend changes and the change in average earnings for non-repurchasing firms
The table presents the relationship between changes in dividends per share between years 0 and 1 for companies that do not repurchase shares in year 0 and the change in average earnings normalized by total assets at the end of year -1. The change in average earnings is computed as the difference between average in years 1 to 3 and years -3 to -1. Observations are grouped according to the sign and size of the change in dividends per share: omissions, renewed payments, decreases, no change, increases. The mean and median earnings changes for each group are then compared to zero and to their counterparts from the 'no change' group. The numbers in the last five columns are the p-values for the means and medians tests.

Type of dividend changes	Number of observations	Mean	Median	Compared to 1		Compared to 'no change'		
				Mean	Median	Mean	Median	
							Wilcoxon	χ^2 test
Omissions	442	-0.012374	-0.005660	0.2417	0.1403	0.0173	0.0503	0.0366
Decreases	740	-0.011059	-0.008062	0.0688	0.0111	0.0039	0.0010	0.0002
No change	2033	0.003655	0.004470	0.0882	0.0026			
Increases:	2927	0.028265	0.024322	0.0000	0.0000	0.0000	0.0000	0.0000
Initiations/ resumed payments	355	0.036042	0.032384	0.0010	0.0000	0.0000	0.0000	0.0000

	Mean	Median	
		Wilcoxon test	χ^2 test
Increases vs. decreases	0.0000	0.0000	0.0000
Increases vs. initiations/resumed payments	0.3130	0.2050	0.1600

1.1.2 Further Evidence on Firm Performance Around Dividend Changes

Table 1.1: The past growth rate of total assets

The table presents the average growth rates for total assets for years -3 to -1 for the various types of dividend changes. The numbers in the last three columns are the p-values for the means and medians tests.

Type of dividend changes	Number of observations	Mean	Median	Compared to 'no change'		
				Mean	Median	
					Wilcoxon	χ^2 test
Omissions	816	0.0829	0.0241	0.2319	0.0000	0.0000
Decreases	1588	0.0890	0.0348	0.1013	0.0000	0.0001
No change	4717	0.0755	0.0435			
Increases:	8645	0.0975	0.0699	0.0000	0.0000	0.0000
Initiations/ resumed payments	740	0.1582	0.0670	0.0000	0.0000	0.0000

	Mean	Median	
		Wilcoxon test	χ^2 test
Increases vs. decreases	0.0778	0.0000	0.0000
Increases vs. initiations/resumed payments	0.0000	0.0050	0.5939

Table 1.2: The future growth rate of total assets

The table presents the average growth rates for total assets for years 1 to 3 for the various types of dividend changes. The numbers in the last three columns are the p-values for the means and medians tests.

Type of dividend changes	Number of observations	Mean	Median	Compared to 'no change'		
				Mean	Median	
					Wilcoxon	χ^2 test
Omissions	813	0.0363	0.0107	0.0016	0.0000	0.0000
Decreases	1591	0.0513	0.0221	0.5516	0.0000	0.0003
No change	4728	0.0548	0.0320			
Increases:	8664	0.0787	0.0550	0.0000	0.0000	0.0000
Initiations/ resumed payments	754	0.1131	0.0711	0.0000	0.0000	0.0000

	Mean	Median	
		Wilcoxon test	χ^2 test
Increases vs. decreases	0.0000	0.0000	0.0000
Increases vs. initiations/resumed payments	0.0000	0.0000	0.0028

Table 1.3: Dividend changes and changes in average capital expenditures

The table presents the relationship between changes in dividends per share between years 0 and 1 and the difference between average capital expenditures in years -3 to -1 and 1 to 3, normalized by total assets at the end of year -1. Observations are grouped according to the sign and size of the change in dividends per share: omissions, renewed payments, decreases, no change increases. The mean and median earnings changes for each group are then compared to zero and to their counterparts from the 'no change' group. The numbers in the last five columns are the p-values for the means and medians tests.

Type of dividend changes	Number of observations	Mean	Median	Compared to 0		Compared to 'no change'		
				Mean	Sign test	Mean	Median	
							Wilcoxon	χ^2 test
Omissions	761	0.01024	-0.00832	0.0855	0.0000	0.0334	0.0000	0.0000
Decreases	1522	0.01411	-0.00232	0.0012	0.0181	0.1885	0.0000	0.0000
No change	4542	0.01843	0.00393	0.0000	0.0000			
Increases:	8383	0.03514	0.01821	0.0000	0.0000	0.0000	0.0000	0.0000
Initiations/ resumed payments	718	0.06860	0.02446	0.0000	0.0000	0.0000	0.0000	0.0000

	Mean	Median	
		Wilcoxon test	χ^2 test
Increases vs. decreases	0.0000	0.0000	0.0000
Increases vs. initiations/resumed payments	0.0000	0.0003	0.0081

Table 1.4: Dividend changes and changes in average nonoperating income

The table presents the relationship between changes in dividends per share between years 0 and 1 and the difference between average nonoperating income in years -3 to -1 and 1 to 3, normalized by total assets at the end of year -1. Observations are grouped according to the sign and size of the change in dividends per share: omissions, renewed payments, decreases, no change increases. The mean and median earnings changes for each group are then compared to zero and to their counterparts from the 'no change' group. The numbers in the last five columns are the p-values for the means and medians tests.

Type of dividend changes	Number of observations	Mean	Median	Compared to 0		Compared to 'no change'		
				Mean	Sign test	Mean	Median	
							Wilcoxon	χ^2 test
Omissions	804	-0.002025	-0.001459	0.0935	0.0000	0.0194	0.0025	0.0061
Decreases	1586	-0.000968	-0.001195	0.3710	0.0000	0.0951	0.0030	0.0018
No change	4709	0.000638	-0.000447	0.1316	0.0000			
Increases:	8659	0.002970	0.000390	0.0000	0.0000	0.0000	0.0000	0.0000
Initiations/ resumed payments	749	0.008076	0.001624	0.0000	0.0000	0.0000	0.0000	0.0000

	Mean	Median	
		Wilcoxon test	χ^2 test
Increases vs. decreases	0.0000	0.0000	0.0000
Increases vs. initiations/resumed payments	0.0000	0.0070	0.0016

Table 1.5: Dividend changes and past returns on assets

The table presents the average returns on assets (computed as the ratio between income before extraordinary items available for common and total assets at the end of the year) for years -3 to -1 for the various types of dividend changes. The numbers in the last three columns are the p-values for the means and medians tests.

Type of dividend changes	Number of observations	Mean	Median	Compared to 'no change'		
				Mean	Median	
					Wilcoxon	χ^2 test
Omissions	817	1.4310	1.4817	0.0000	0.0000	0.0000
Decreases	1594	4.8864	4.0850	0.9844	0.3079	0.2052
No change	4733		4.8831	4.2677		
Increases:	8671	7.6857	6.9927	0.0000	0.0000	0.0000
Initiations/ resumed payments	754	4.0143	3.8098	0.0001	0.0876	0.0620

	Mean	Median	
		Wilcoxon test	χ^2 test
Increases vs. decreases	0.0000	0.0000	0.0000
Increases vs. initiations/resumed payments	0.0000	0.0000	0.0028

Table 1.6: Dividend changes and future returns on assets

The table presents the average returns on assets (computed as the ratio between income before extraordinary items available for common and total assets at the end of the year) for years 1 to 3 for the various types of dividend changes. The numbers in the last three columns are the p-values for the means and medians tests.

Type of dividend changes	Number of observations	Mean	Median	Compared to 'no change'		
				Mean	Median	
					Wilcoxon	χ^2 test
Omissions	814	-3.8468	0.2570	0.0000	0.0000	0.0000
Decreases	1592	2.0923	2.6543	0.0001	0.0000	0.0020
No change	4731		2.9453	3.3553		
Increases:	8668	6.0673	5.8631	0.0000	0.0000	0.0000
Initiations/ resumed payments	754	2.1907	4.1115	0.0305	0.01030	0.0226

	Mean	Median	
		Wilcoxon test	χ^2 test
Increases vs. decreases	0.0000	0.0000	0.0000
Increases vs. initiations/resumed payments	0.0000	0.0000	0.0000

Table 1.7: Dividend changes and changes in average returns on assets

The table presents the relationship between changes in dividends per share between years 0 and 1 and the difference between average returns on assets in years 1 to 3 and -3 to -1. Observations are grouped according to the sign and size of the change in dividends per share: omissions, renewed payments, decreases, no change increases. The mean and median earnings changes for each group are then compared to zero and to their counterparts from the 'no change' group. The numbers in the last five columns are the p-values for the means and medians tests.

Type of dividend changes	Number of observations	Mean	Median	Compared to 0		Compared to 'no change'		
				Mean	Sign test	Mean	Median	
							Wilcoxon	χ^2 test
Omissions	814	-5.3025	-1.8467	0.0000	0.0000	0.0000	0.0020	0.0189
Decreases	1592	-2.7812	-1.7043	0.0000	0.0000	0.0005	0.0081	0.0015
No change	4731	-1.9389	-1.1037	0.0000	0.0000			
Increases:	8667	-1.6167	-0.9533	0.0000	0.0000	0.0049	0.0099	0.0488
Initiations/ resumed payments	754	-1.8235	0.02867	0.0017	0.9130	0.7441	0.0000	0.0004

	Mean	Median	
		Wilcoxon test	χ^2 test
Increases vs. decreases	0.0000	0.0000	0.0000
Increases vs. initiations/resumed payments	0.4421	0.0020	0.0018

1.1.3 Results Based on Propensity Score Matching

Table 1.1: Dividend increases compared to no change

The table presents the comparison between the shift in average earnings for firms that increased dividends and that of firms that kept them constant. We control for the influence of previous profitability, payout ratios, market-to-book ratios and capital expenditures. Logit propensity scores are used for each year in the period covered by the study.

Year	1987	1988	1989	1990	1991	1992	1993
t-value	7.73	3.33	2.35	3.25	4.27	2.83	3.94
Increase (treatment)	0.0285	0.0215	0.0070	0.0026	0.0112	0.0258	0.0372
No change	-0.0067	-0.0118	-0.0046	-0.0159	-0.0064	0.0043	0.0189
Year	1994	1995	1996	1997	1998	1999	2000
t-value	3.72	4.74	4.55	2.28	2.77	4.74	3.49
Increase (treatment)	0.0421	0.0368	0.0314	0.0221	0.0116	0.0085	0.0073
No change	0.0191	0.0127	0.0090	0.0106	-0.0024	-0.0153	-0.0097

Table 1.2: Dividend decreases compared to constant dividends

The table presents the comparison between the shift in average earnings for firms that decreased dividends and that of firms that kept them constant. We control for the influence of previous profitability, payout ratios, market-to-book ratios and capital expenditures. Logit propensity scores are used for each year in the period covered by the study.

Year	1987	1988	1989	1990	1991	1992	1993
t-value	-2.09	-2.47	-2.93	-1.65	-3.64	-2.29	-1.59
Decrease (treatment)	-0.0092	-0.0113	-0.2275	-0.0169	-0.0130	0.0006	0.0134
No change	-0.0080	-0.0042	0.0029	-0.0105	-0.0062	0.0032	0.0192
Year	1994	1995	1996	1997	1998	1999	2000
t-value	-2.11	-2.31	-2.08	-2.24	-3.79	-2.52	-2.20
Decrease (treatment)	0.01932	0.0145	-0.0003	-0.0128	-0.0185	-0.0250	-0.0262
No change	0.03420	-0.0091	-0.0001	0.0133	0.0041	-0.0189	-0.0043

Table 1.3: Dividend increases compared to dividend decreases

The table presents the comparison between the shift in average earnings for firms that decreased dividends and that of firms that increased them. We control for the influence of previous profitability, payout ratios, market-to-book ratios and capital expenditures. Logit propensity scores are used for each year in the period covered by the study.

Year	1987	1988	1989	1990	1991	1992	1993
t-value	5.25	2.14	1.57	2.29	4.29	3.85	3.21
Increase (treatment)	0.0258	0.0206	0.0069	0.0006	0.0104	0.0252	0.0353
Decrease	-0.0172	-0.0072	-0.0101	-0.0225	-0.0232	0.0136	-0.0033
Year	1994	1995	1996	1997	1998	1999	2000
t-value	3.06	3.23	2.61	4.56	3.85	3.67	4.43
Increase (treatment)	0.0399	0.0341	0.0309	0.0217	0.0103	0.0069	0.0073
Decrease	-0.0043	-0.0165	-0.0043	-0.0312	-0.0137	-0.0215	-0.0121

Chapter 2

Dividend Policy in Switzerland

Abstract

The paper examines dividend policy for a sample of Swiss companies. Several factors that determine cross-sectional variations in dividend policy such as profitability, growth opportunities and riskiness are identified. Price volatility seems to stand out as the most significant factor. Looking at the relationship between dividends and earnings over time, dividend changes are more closely associated with past and current rather than future net income growth. However, they do confirm a persistent shift in the level of earnings. There also is a significant relationship between losses and dividend cuts. All these findings point to managers' reluctance to cut dividends as a factor that gives informational content to dividend changes.

2.1 Introduction

In the ideal world of Modigliani and Miller (1961), dividends are irrelevant. The value of a firm is given by its investment opportunities. Dividends are just the residual and investors faced with consumption shocks can always get their own "homemade" dividends.

In "real life", however, dividend policy is one of the main concerns for managers and investors. Empirical studies have generally found that dividend increases are considered good news by investors, while dividend decreases lead to negative reactions.

Several explanations for the existence and importance of dividends have been suggested over the last decades. Dividends could be used as signals for the actual position of a firm. Companies could communicate their better quality by paying higher dividends - low-quality firms will not be able to imitate them since dividends involve costs in terms of foregone investment, taxes or the need to attract external capital. Agency theory suggests that dividends may be a way to reduce the overinvestment problem or a means to keep firms in the capital markets. Dividends may also be used to attract institutional investors, which are better monitors and prefer dividends for regulatory reasons. Behavioural aspects, such as self-control, fairness or regret aversion may also be important parts of the picture.

Each of the main theories concerning dividend policy has found at least some support in actual data. However, empirical research has also revealed weaknesses of these explanations and a broad consensus concerning the "best" theory of corporate payout seems far away. We may know more about the "dividend puzzle", but we are still without a definite solution.

The present paper examines some of the characteristics of dividend policy using Swiss data. The first part presents factors that influence variations in dividend payments across companies at a given point in time. The second part analyses the changes in dividends over time.

The cross-sectional analysis for the 2000-2003 period compares the characteristics of dividend payers and non-payers. It then identifies several determinants of the differences between dividend payers in terms of payout ratios and dividend yields. The results show that companies that are less risky, larger, with lower growth opportunities and lower leverage tend to pay higher dividends. Institutions show a preference for dividend-paying companies, but there is little evidence that they prefer higher payout ratios or dividend yields.

Quite interestingly, the factor that comes out as having the strongest influence on payout ratios and dividend yields is price volatility. This may be interpreted as a sign that companies with higher earnings uncertainty are less likely to pay high dividends - or to pay dividends at all.

The second part of the paper then focuses on the relationship between dividends and earnings over time. Previous studies suggest that managers may target either payout ratios or dividends per share - therefore the paper deals with both measures.

A first brief section looks at payout ratios. The Lintner model (1956) is found to perform reasonably well for a majority of companies in the sample. However, results for other companies

are not so good and very few firms actually declare they are targeting payout ratios.

Dividends per share are much more widespread as a headline indicator of dividend policy. The final section of the paper looks at changes in (split-adjusted) dividends per share and seeks to determine whether these changes have informational content. The results show that dividend increases follow periods of high earnings and cash flow growth, while dividend decreases come after declines.

A closer look at the data reveals that there may nevertheless be some information conveyed by dividend changes. The average future level of earnings for dividend increases is significantly higher than the mean over the previous few years. The earnings of dividend decreasers decline slightly and remain at a persistently low level around the dividend change.

Brav, Graham, Harvey and Michaely (2004) show that, while managers agree that dividends do convey information to investors, they do not think in the terms of academic signalling models. Based on the results mentioned above, we could formulate an alternative explanation for the signalling value of dividends. Changes in dividend payments can be informative due to managers' reluctance to cut dividends. A dividend increase can signal the fact that the management is confident enough that future earnings will settle at a higher level. A dividend decrease may signal that the management thinks that earnings have indeed stabilized at a lower level and that the current level of dividends is no longer sustainable. Thus dividend changes become informative not because they are too costly to be imitated by other companies, but because dividend decreases are costly in terms of managers' reputation.

Going on to other possible specificities of the Swiss market, it seems that - perhaps surprisingly - there is no significant connection between ownership concentration and dividend yields or payout ratios. Also, the relationship between dividend policy and firm size is only marginally significant. Thus if one thinks of Swiss companies as being grouped into large, widely held companies and smaller, closely held ones, the difference between the two groups in terms of dividend policy does not seem very clearcut. One caveat about this conclusion, however, is that even the smaller companies in the sample are still large.

The next section of the paper summarizes some of the alternative theories concerning dividends as well as previous empirical findings. Section 3 briefly presents the data, and section 4 identifies some of the sources of cross-sectional variation in dividend policy. Section 5 examines the relationship between dividends and earnings over time. The partial adjustment model of Lintner (1956) is applied to a sample of Swiss companies and is found to perform reasonably well in most cases. Section 5.2 examines the relationship between dividend changes and earnings in the surrounding years. The evidence seems to support the idea that managers will increase dividends gradually, while trying to make sure the increase is sustainable - and that they will try to avoid cutting dividends unless the condition of the firm worsens to a significant extent. Section 6 presents the conclusions of the paper.

2.2 Motivation and Related Literature

Dividend policy has long been a subject of research and debate. There are many theoretical and empirical results describing the decisions companies make in this area. At the same time, however, there is no generally accepted model describing payout policy. Moreover, empirical findings are often contradictory or difficult to interpret in light of the theory.

In their seminal paper, Miller and Modigliani (1961) showed that under certain assumptions (perfect capital markets, rational behaviour and perfect certainty) dividends are irrelevant; all that matters is the firm's investment opportunities. A firm will always be able to compensate the cash outflow by attracting new money (via new shares or debt) if that is required by its investment programme.

In reality, however, people do seem to care about dividends. Lintner's (1956) classical study on dividend policy suggests that "dividends represent the primary and active decision variable in most situations". His interviews and research conducted on 28 companies showed that firms set their current dividends based on their previous history. The main decision concerned the possible *change* in the payment rate and this decision was based on (expected future) earnings. Dividend policy seemed characterized by "inertia and conservatism"; managers seemed to think that investors reward stability and avoided making unsustainable changes in payout ratios. Based on these findings, Lintner suggested a model of partial adjustment to a given payout rate.

In a recent study, Brav, Graham, Harvey and Michaely (2004) find that "maintaining the dividend level is a priority on par with investment decisions" and that less than half of the executives they interviewed agree that "the availability of good investment opportunities is an important or very important factor affecting dividend decisions". Although to a somewhat lesser degree, Lintner's findings seem valid almost half a century later.

Researchers have tried to explain the importance of dividends by looking for "imperfections" that can undermine the irrelevance proposition. Some of the most important ideas are summarised below.

An important class of models is based on the idea that the assumption of perfect information may be unrealistic and that dividends can be used as signals of firm quality. Bhattacharya (1979) builds a two-period model with two types of firms. Investments are made during the first period; their expected profitability is known to management, but not to outside investors. In order to signal the quality of their investment, the managers of "good" firms (managers are assumed to act in the interest of initial shareholders) will commit to paying high dividends in the second period. Since attracting outside financing (during the second period) is expensive due to transaction costs, the "low quality" firms will be unable to imitate the "high quality" ones. The alternative models of Miller and Rock (1985) and John and Williams (1985) consider the cost of dividends in terms of foregone investment and taxes respectively.

The signalling models provide an explanation for the positive stock price reaction to the announcement of dividend increases or initiations. However, the empirical evidence on this hypoth-

esis is mixed. In an early study, Watts (1973) found that unexpected changes in earnings and unexpected changes in dividends were related although he remained sceptical about the possibility to make money by exploiting this regularity. Penman (1983) finds that "both dividend announcements and managements' earnings forecasts possess information about managements' expectations". Using a sample of dividend initiations and omissions, Healy and Palepu (1988) find that dividend initiations and omissions have informational content (the change in earnings is related to announcement-day returns even controlling for previous earnings), but this only holds for year 1. Yoon and Starks (1995) and Denis, Denis and Sarin (1994) show that dividend change announcements are associated with revisions in analysts' forecasts of current income. Nissim and Ziv (2001) control for mean reversion in earnings and show that dividend changes are useful in predicting future earnings.

On the other hand, DeAngelo, DeAngelo and Skinner (1996) examine the case of companies that experience the first earnings decline after at least nine years of sustained earnings growth. They find that more than 60% of managers still increase dividends in the year earnings decrease. Moreover, dividend changes in year 0 (the year of the earnings decline) are not related to future unexpected earnings changes. Benartzi, Michaely and Thaler (1997) show that dividend increases are *not* followed by faster earnings growth. Grullon, Michaely, Benartzi and Thaler (2003) challenge the findings of Nissim and Ziv (2001). They show that, after controlling for the difference in the speed of adjustment following positive and negative earnings surprises, adding dividend changes into the model does not improve forecasting performance.

Based on the mixed results for the signalling theory, Grullon, Michaely and Swaminathan (2002) suggest that rather than an increase in profitability dividend increases could reflect a decrease in risk - the *"maturity hypothesis"*. They find that while profitability declines following a dividend increase, systematic risk in a three-factor Fama-French model decreases. They argue that as firms become more mature (and therefore less risky, but with lower growth opportunities), they will be more likely to pay large dividends to their shareholders.

Agency theory suggests that dividends can be used as a means to control a firm's management. Distributing dividends reduces the free cash flow problem and increases the management's equity stake. Easterbrook (1984) also suggests that dividends can be used to keep firms in capital markets, where they are monitored by potential investors. This is useful since monitoring by existing shareholders can be hindered by coordination problems. Lang and Litzenberger (1989) find that dividend increases are associated with higher positive share price reactions for companies with Tobin's q smaller than unity - that is, for companies with lower growth opportunities.

Another agency problem is that between shareholders and debtholders. The risk that shareholders will expropriate debtholders by paying themselves excessive dividends has led to the often-encountered covenants restricting dividend policy in bond contracts. Hadjinicolaou and Kalay (1984) and Maxwell and Stephens (2003) examine the reaction of stock and bond prices to dividend announcements. They find that although dividend increases are more favourable to shareholders, the overall value of the firm goes up thus there is an information effect beside the possible wealth transfer.

Allen, Bernardo and Welch (2000) suggest that dividends can be used to attract *institutional*

investors, which do not pay dividend taxes and have to invest in dividend-paying companies for regulatory reasons. The firm will benefit from attracting this particular type of investors since they are better monitors and they can also more easily trade large blocks of shares. In an empirical study, Grinstein and Michaely (2002) find that institutions do choose dividend-paying companies; however, they show no preference for higher dividend yields.

Baker and Wurgler (2004) put forward a catering theory of dividends. They build a measure indicating investors' preference for dividends and show that firms' dividend policies follow this preference.

To sum up, there are several credible explanations for the existence of dividends, although none of them is generally accepted or above criticism. The Miller and Modigliani proposition of dividend irrelevance is still widely mentioned, as is the idea of a "dividend puzzle".

2.3 Data

The paper uses data on listed Swiss companies over the 1974-2004 period. The main data source is Datastream; annual reports were also used (for instance to get information on the main shareholders). Data on repurchases are taken from Compustat Global Vantage. Foreign companies listed in Switzerland have been excluded from the sample. Financial companies and utilities are also not included. This is current practice in empirical literature, since it is generally assumed that their difference regulatory environment could influence dividend policy. Moreover, in the case of the Swiss sample, a large proportion of the financial companies with available data were cantonal banks, which can be considered difficult to compare to purely private, non-financial companies. As a result, there are 175 non-financial, non-utility companies in the overall sample. Because of limited data availability, smaller samples are used in some of the following sections.

Unlike American companies, that pay dividends on a quarterly basis, Swiss companies usually pay dividends only once a year. (Ex-dividend days are usually in May or June). Thus the analysis in this paper uses yearly observations. This has the obvious disadvantage of reducing the number of data points. On the other hand, studies such as Lintner (1956) and DeAngelo, DeAngelo and Skinner (1992) argue that the main horizon for dividend policy is the whole year even in the American case.

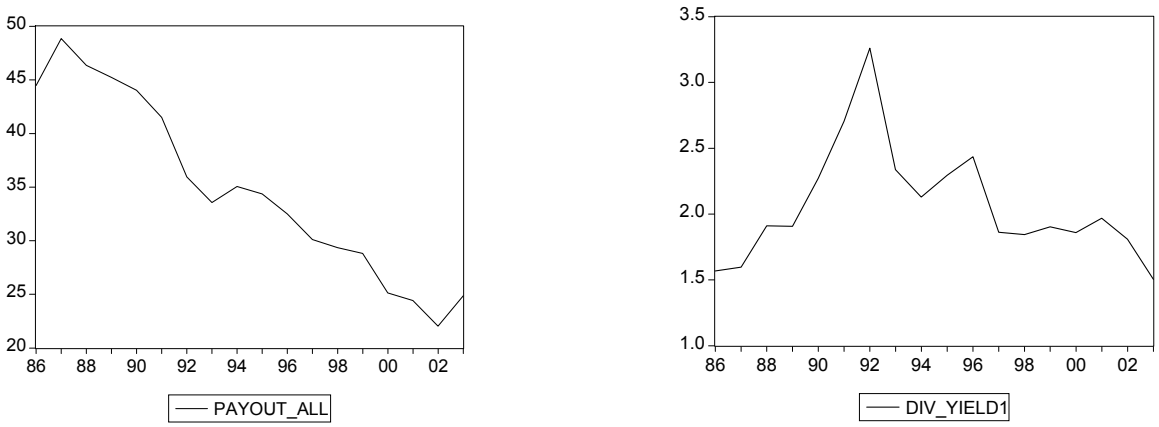

Figure 1. Left: average payout ratio; right: average dividend yield over the 1986-2003 period for all available observations in Datastream

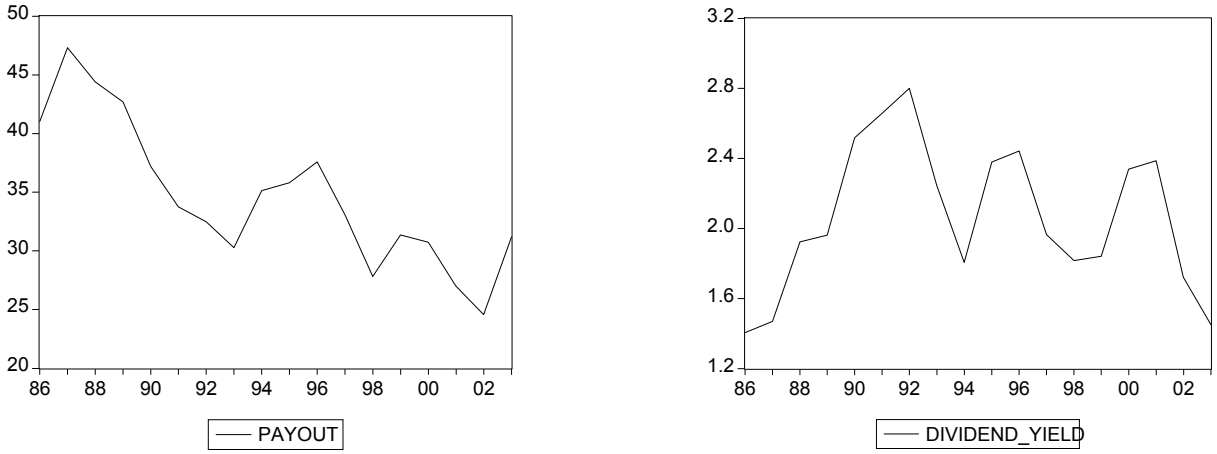

Figure 2. Left: average payout ratio; right: average dividend yield for 40 companies with continuous data over the 1986-2003 period

Figures 1 and 2 present payout ratios and dividend yields over the 1986-2003 period. The mean payout ratio was 30.99%, while the mean dividend yield was 1.96%. Payout ratios had a decreasing trend over the interval - a tendency that is also reported for the US (Allen and Michaely, 2002, Brav, Graham, Harvey and Michaely 2004) as well as other countries (Osobov 2004). Dividend yields did not have any definite trend; their movement is influenced by both changes in dividends and movements in share prices.

2.4 Cross-Sectional Comparisons of Dividend Payments

This part of the paper examines the factors that determine variations in dividend policy across firms. The comparison is based both on averages for the 2000-2003 period and on data for a single

year (2003).

There are several groups of variables that are considered in the cross-sectional comparisons:

- market-to-book ratios, as a proxy for growth opportunities. Since low market-to-book companies are more likely to have free cash flow problems, it is to be expected that they pay (higher) dividends.

- total assets and total sales, as proxies for firm size. Large companies are usually "mature" companies and therefore have more available cash relative to their positive NPV projects. Moreover, they are more likely to have widely dispersed shareholdings, and dividends could be used as a way to "keep" firms "in the capital markets" in order to enhance monitoring. At the same time, however, large companies are usually considered less informationally opaque than small companies, so there may be less need for dividends as costly signals. Thus observing the actual connection between firm size and dividend policy can be interesting.

- the firms' betas and price volatility (computed as the band within which the share price moved around the mean price during the year) as measures of firm risk. The "maturity hypothesis" suggests that dividend increases are associated with decreases in risk rather than increases in profitability. Also, risk is an important firm characteristic in itself and it is important to control for it.

- capital gearing, as a measure of leverage in book terms. Debt covenants often include limits concerning dividend payments as a way to reduce the agency problem between shareholders and debtholders. On a different level, both debt and dividends can be used to reduce the free cash flow problem. Johnson (1995) suggests that debt and dividends could be alternative means to control management.

- returns on assets and returns on equity, as measures of firm profitability. While it may seem obvious that more profitable companies will pay higher dividends, it is important to control for this measure while examining the impact of the other factors.

- several indicators for the ownership structure of these companies. The ownership of large Swiss companies is quite varied from family-owned companies to widely-held ones, or companies owned by investment funds. Thus it is interesting to examine the impact of the ownership structure on dividend policy.

2.4.1 Who pays dividends?

There are several features that distinguish firms that pay dividends from firms that do not. The analysis in this subsection focuses on the 2000-2003 period and distinguishes between companies that had at least one dividend payment over the four years and companies that had none. Table 2.1 summarizes some of the main features of the two groups.

Table 2.1: Comparison between dividend-paying and non-paying companies, 2000-2003

Variable	Mean (paying group)	Mean (non-paying group)	p-values
Mean market-to-book ratio, 2000-2003	2.226	3.401	0.052
Mean returns on assets, 2000-2003	5.093	-4.566	0.000
Mean returns on equity, 2000-2003	10.893	-21.359	0.000
Mean capital gearing, 2000-2003	37.770	37.120	0.881
Beta coefficient	0.86	1.33	0.009
Mean price volatility, 2000-2003	24.740	38.250	0.000
Mean total assets, 2000-2003 (CHF, thousands)	4643377	1484523	0.108
Mean sales, 2000-2003 (CHF, thousands)	3017036	467396	0.184
Mean foreign-owned share of capital, 2001-2003	8.08	15.42	0.081
Mean share of capital owned by institutions, 2001-2003	3.61	1.81	0.648
Share of capital owned by large shareholders, 2003	46.03	41.78	0.412
Share of voting rights for large shareholders, 2003	42.19	40.34	0.780

Not surprisingly, companies that paid dividends over the 2000-2003 period had significantly higher profitability than companies that did not. It is interesting to note that non- paying companies made losses on average, while companies that paid dividends had positive mean returns on assets and equity.

Non-paying firms had a higher market-to-book ratio. Indeed, agency theory suggests that companies with better growth opportunities (proxied by the market-to-book ratio) are less likely to have free cash flow problems. Therefore dividends as an instrument to discipline management are less useful to these companies. The fact that leverage is virtually identical for the two groups of companies may mean that dividends and debt are used in different ways to control management, as suggested by Johnson (1995).

Companies that did not pay dividends over the four years also had higher price volatility and higher betas. They also tended to have lower total assets and lower sales (although the difference is not significant for the latter). Together with the higher market-to-book ratio, these differences give support to the maturity hypothesis of Grullon, Michaely and Swaminathan (2002): companies that are younger and riskier tend to pay lower dividends.

Ownership concentration does not seem to affect the option to pay dividends. This conclusion holds whether one considers the share of voting rights or the share of the equity owned by large shareholders (shareholders that have more than 5% of a company's voting rights and that are obliged to make their ownership public under Swiss regulations). Two other aspects concerning ownership seem to be more closely related with the decision to pay dividends. Institutional investors

(investment companies and pension funds) held larger shares in dividend-paying companies, but overall the difference is not significant. (Pension funds taken separately did show a clear preference for dividend-paying companies, perhaps for regulatory reasons.) This finding is consistent with results from previous papers, such as Grinstein and Michaely (2003). Dividend-paying companies also had a lower foreign-owned share of capital.

Based on these results and a look at the overall sample, one can conclude that companies which do not pay dividends seem to be either old, established companies going through protracted difficulties, or - more often - younger, smaller and riskier companies.

2.4.2 Sources of Cross-Sectional Variation

This section focusses on the relationship between payout ratios and the variables described above over the 2000-2003 period. It also presents separately the results for the subsample of companies that had at least one dividend payment in one of the four years. As it will be shown below, the relationship between dividend payments and many of the selected variables is not always monotonic. Results for previous years are also presented in order to check the persistence of the relationships found for the more recent period. To avoid cluttering the presentation, the largely similar findings using dividend yield (as alternative measure of dividend policy) are not reported. The more important differences are discussed at the end of the section.

Table 2.2 shows that, taking the whole set of firms, more profitable companies have higher payout ratios. Taking just the group of companies with positive dividend payments, however, the relationship much weaker, especially for returns on equity.

The fact that companies with higher price volatility and higher market-to-book ratios have lower dividend yields and payout ratios supports the "maturity hypothesis" of Grullon, Michaely and Swaminathan (1994). "Younger" (smaller, riskier, growing) companies pay less dividends than "older" ones. One could note, however, that correlations with firm size are not significant in this sample, so one should be careful in drawing the picture of the standard "life-cycle" of a firm. The results concerning riskiness can also be related to Lintner's (1956) finding that managers are reluctant to increase dividends if they are not sure that future earnings will be stable enough to prevent dividend decreases.

Capital gearing is negatively correlated with the payout ratio. It may be the case that firms that are highly levered find additional debt very expensive and try to increase their retained earnings. Debt covenants also usually include restrictions on dividend payments. It is interesting to note that, in a US study, DeAngelo, DeAngelo and Stulz (2004) find a positive association between leverage and dividends. This suggests that high dividends and high leverage are used together in the case of companies with potential free cash flow problems. (One can also note that dividend payments automatically increase leverage by reducing equity and total assets). The relationship found in the Swiss sample can be taken to suggest a higher influence of debt covenants and the use of debt and dividends as substitutes rather than complements in solving agency problems as found in Johnson (1995).

Dividend policy shows no very strong influence from ownership structure. The relationship

Table 2.2: Payout ratios and firm characteristics

Variables	Correlation (averages 2000-2003)	Correlation (2003)	Correlation paying subsample (averages 2000-2003)	Correlation paying subsample (2003)
Market-to-book ratio	-0.188***	-0.001	-0.114	-0.028
Returns on assets	0.337***	0.419***	0.266**	0.205**
Returns on equity	0.199**	0.332***	0.006	-0.063
Sales	0.063	0.050	0.028	0.068
Total assets	0.067	0.066	0.033	0.076
Capital gearing	-0.132	-0.176**	-0.196**	-0.238***
Price volatility	-0.497***	-0.375***	-0.407***	-0.287***
Voting rights of large shareholders (2003)	-0.004	-0.029	0.030	-0.016
Capital share of large shareholders (2003)	-0.032	-0.011	-0.015	-0.068
Share of capital owned by families and employees	-0.096	-0.074	-0.121	-0.164
Foreign-owned share of capital	-0.096	-0.014	0.194**	0.107
Share of capital owned by institutions	-0.036	-0.094	-0.032	0.019
Dividend yield	0.633***	0.537***	0.418***	0.367***

Table 2.3: Factors influencing the payout ratio

Dependent variable: payout ratio in 2003.

	Coefficients (p-values)			
Variables	1993	1998	2003	2003
Constant	70.871	57.276	46.428	42.045
	(0.000)	(0.000)	(0.000)	(0.000)
ROA (t-1)	0.710	0.301	0.511***	0.558***
	(0.115)	(0.197)	(0.004)	(0.000)
Capital gearing (t-1)	-0.519***	-0.176	-0.203*	-0.202**
	(0.007)	(0.221)	(0.081)	(0.048)
Price volatility (t-1)	-0.913**	-0.394*	-0.452*	-0.381*
	(0.022)	(0.054)	(0.076)	(0.064)
Total assets (in billions; t-1)	-0.280	0.020	0.220*	0.017***
	(0.192)	(0.859)	(0.059)	(0.009)
Market-to-book ratio (t-1)	-0.913**	-1.495*	-0.662	-0.492
	(0.022)	(0.097)	(0.176)	(0.312)
Voting rights			-0.017	
(large shareholders, 2003)			(0.835)	
Adjusted R^2	0.244	0.146	0.164	0.185
Number of observations	59	64	71	97

between ownership concentration (the share of capital or voting rights owned by large shareholders) and dividend policy is inconclusive (usually negative and insignificant for the payout ratio and positive and insignificant for the dividend yield). As may be expected, there is a negative correlation between the share o capital owned by families (and employees) and the two measures of dividend policy but the relationship is again not significant. While the foreign participation in companies that made no dividend payments over the period was higher than in the dividend-paying companies, within the latter group foreign investors seem to prefer companies with higher payout ratios.

There is also a positive and significant relationship between dividend yields and payout ratios. While the relationship is hardly surprising, it shows that one of the reasons for higher dividend yields is that companies pay a higher share of their earnings as dividends.

The simple analysis of correlations allows us to determine several factors affecting dividend policy. These findings can be checked using regression analysis. The multivariate results show that the variables outlined above explain part of the variability in dividend policy across firms. Robust (White) residuals were used to avoid heteroskedasticity problems.

Table 2.3 presents the main factors influencing payout ratios for three points in time: 1993, 1998 and 2003. Payout ratios are regressed on lagged measures of profitability, leverage, risk, size, growth opportunities and ownership concentration. The first two years are characterised by a growing economy and increasing share prices (the more so for the second period) and thus complement the picture provided by the more recent years of declining share prices and low economic growth1. An important caveat is that going back towards the early 1990s reduces data availability and the sample size. Since reporting major shareholdings has only been mandatory in Switzerland since 2002, the regression for 2003 is the only one that includes a measure of ownership concentration.

In all three years, profitability is positively associated with payout ratios. The relationship is weaker during the periods of higher economic growth when growth opportunities are larger and the opportunity cost of dividends increases.

Leverage is negatively associated with the payout ratio, just as the previous correlation analysis had suggested. The relationship is not significant for 1998, suggesting that debt covenants are less likely to become binding during a period of higher growth.

Price volatility and the market-to-book ratio both have a negative impact on payout ratios, but the effect of the former seems to be stronger. The relationship with firm size (proxied by total assets) is generally weak except for the smaller sample from 2003.

As expected from previous results, ownership concentration does not have a significant influence on payout ratios. While the sign is indeed negative the work of La Porta, Lopez-de-Silanes and Shleifer (2000) for instance suggests such a relationship the relationship is extremely weak. This is confirmed by the results of Goergen, Renneborg and Correia da Silva (2003) for Germany.

Compared to payout ratios, dividend yields show a weaker relationship with profitability and leverage. While price volatility is an important factor for explaining payout ratios, it is even more so for dividend yields. These findings are not surprising, since the dividend yield generally has a negative relationship with growth opportunities. The relationship with the ownership measures is again weak. The explanatory power of the analogous regressions for the dividend yield is higher.

To sum up, more profitable, less risky, larger, less leveraged companies with lower growth opportunities pay more dividends. Price volatility appears to be a really strong factor connected with cross-sectional variation in dividend policy. The explanation for this may be that when future earnings are uncertain managers are unwilling to commit to large cash payouts for the future. Dividend policy seems to be surprisingly uniform across different ownership structures a finding which is quite interesting for a Swiss sample.

2.4.3 A Note on Repurchases

A final point in the cross-sectional analysis concerns the relationship between dividends and repurchases. Data on repurchasing activity is based on the "Purchase of stock" item from Compustat.

It seems that as in the American case repurchases are becoming an increasingly popular method to disburse cash to shareholders, although they seem to still be less widespread in Switzerland (see

Table 2.4: Dividends and repurchases

The table presents the average levels of returns on assets, returns on equity and price volatility over the 2000-2002 period for four groups of companies: those that did not repurchase shares and did not pay dividends over the three years, those that only repurchased shares, those that only paid dividends and those that disbursed cash using both methods.

Variable	No payment	Repurchases	Dividends	Dividends and repurchases	p-value, ANOVA test
ROA	-15.603	-12.332	3.494	5.200	0.004
ROE	-30.937	-13.552	6.087	10.506	0.002
Price volatility	35.408	35.442	23.393	19.067	0.003

also Dumont et al. 2004). Nonetheless, since the data for this subsection is rather sparse, the results should be interpreted with care. Table 4 presents the relationship between payout policy and the profitability and price volatility of the companies in the sample. There are four groups of firms: those that did not pay dividends and did not repurchase shares over the 2000-2002 period (16 companies), those that only repurchased shares (4 companies), those that only paid dividends (73 companies), and those that chose both types of payouts (15 companies).

While companies that did not pay any cash or just repurchased shares made losses on average, companies that paid dividends had positive mean profits with the most profitable group using both types of payments. Price volatility shows the opposite pattern. The last column shows the p-values for the ANOVA test for the equality of the means for the four groups. The results suggest that the differences are significant.

There seem to be no significant differences in terms of ownership concentration and firm size between the four groups. Companies that did not pay any cash had higher market-to-book ratios than those who paid dividends, but companies that only used repurchases had lower ratios (since "repurchase-only" subsample has just four companies, it is difficult to draw a definite conclusion based on this result).

One can tentatively conclude that companies with stable positive earnings generally choose dividends (with the most profitable and least risky companies choosing both types of payment). Companies with low and volatile earnings (and perhaps higher growth opportunities) choose to pay out no cash or to use just repurchases. This pattern is in line with what Jagannathan, Stephens and Weisbach (2000), Guay and Harford (2000) and Fama and French (2001) find for the United States. It confirms that there are significant differences between dividends and repurchases, and that there is more at work than the "substitution" process described by Grullon and Michaely (2002).

2.5 The Dynamic Aspect: Dividends and Earnings

This part of the paper deals with variations in dividends over time. It focuses on the relationship between dividends and earnings and explores the reasons for changes in dividends for a given

company. Brav, Graham, Harvey and Michaely (2004) find in their survey of US financial executives that 40% of them declare they target dividends per share, 28% target dividend payout ratios, and 27% target growth in dividends per share. Section 5.1 examines the importance of dividend payout ratios, based on the Lintner model. Section 5.2 then looks at changes in dividends per share and their informational content.

2.5.1 The Lintner Model and Payout Targets

As a general rule, dividend policy seems to be fairly stable over time. For instance, adding lagged measures of the payout ratio or the dividend yield to the regressions in the previous section shows that they are highly significant and they improve the explanatory power of the regressions by a large amount. Lintner (1956) suggests that managers set targets concerning payout ratios and they adjust dividend payments in order to gradually reach that target. Under this hypothesis, the target ratio (γ) is given by

$$D_t^* = \gamma E_t, \tag{2.1}$$

and the adjustment equation is

$$D_t - D_{t-1} = \alpha + \delta(D_t^2 - D_{t-1}) + u_t, \tag{2.2}$$

where D_t are dividends paid in year t, E_t are earnings for the same year, and D_t^* is the desired level of dividends in year t.

Combining the two equations, the model proposed by Lintner can be written as:

$$\Delta D_t = \alpha + \beta_1 D_{t-1} + \beta_2 E_t + u_t. \tag{2.3}$$

The change in dividends is thus modelled as a function of lagged dividends and current earnings. Managers are supposed to have in mind a "target" payout ratio and they slowly adjust dividends in order to reach that target. The adjustment is gradual since, as Lintner finds, managers want to make sure that changes in earnings are lasting and they will avoid making decisions that will have to be reversed soon.

Equation 3 is a partial adjustment model, which can be consistently estimated by ordinary least squares. The target payout ratio is estimated as β_2/β_1, while the speed of adjustment is given by β_1.

Estimating the Lintner model requires data over a longer period of time, and as a result the sample is reduced to 60 companies for the 1987-2003 period (16 years). The results of estimating the partial adjustment model for each of the companies are summarized in Table 2.5.

The mean target ratio is around one-third, while the median is around one-fifth. The actual mean payment ratio for the companies in the sample was 30.99%, while the median was 30.32%. Thus estimated target payout ratios are close to the actual ones, and the explanatory power of the model is high (the average adjusted R^2s are above 40%). There was no significant autocorrelation in any of the regressions. Results are also quite similar if one looks at the 25 companies that had data for the longer 1975-2003 period.

Table 2.5: Estimation results for the partial adjustment model for the payout ratio (60 companies, 1987-2003)

	Speed of adjustment	Target payout ratio	Adjusted R^2
Mean	0.66	0.33	0.43
Median	0.63	0.20	0.48
Standard deviation	0.40	0.52	0.26

For all US companies with valid Compustat data, Brav et al. (2004) find average payout ratios of 37%, 17% and 8% for the 1950-1964, 1965-1983 and 1984-2002 periods respectively. The mean speed of adjustment was 0.67, 0.4 and 0.33 over the three successive intervals. (Lintner's estimates suggest a target payout ratio of around 50%). Given the low explanatory power and the high variability in terms of estimated target payout ratios, Brav et al. suggest that the relationship suggested by Lintner may have grown weaker over time. It is known that payout ratios have declined over time in the US; Swiss data seem to suggest a similar trend (the average payout ratio for the companies in the sample decreased from 46.28% in 1987 to 25.11% in 2003). Moreover, while the overall results look good on average for the Swiss sample, there is once again considerable variability at firm level. The model performs better for some companies than for others. Adjusted R^2s vary from a low of -0.09% to a high of 99%. The bulk of the firms are however somewhere between 20 and 70%.

It is also important to note that out of the 60 Swiss companies in the sample, only four stated in their annual report for 2003 that they target the payout ratio. The range the four companies gave for the target was between 25 and 33% - a number which is close to the estimated mean and median targets for the sample. The partial adjustment model, however, did not perform well for three out of the four companies. At least in the Swiss case, it seems that when the management actually declares a formal target ratio this is more a kind of signal for future dividend policy rather than a description of current realizations.

To sum up, it seems that there is evidence that payout ratios are relatively stable over time or that they change gradually. The practice of formally targeting a particular payout ratio, however, is not very widespread. Managers seem to concentrate mainly on dividends per share the focus of the following section.

2.5.2 Dividends and Past, Current and Future Earnings

Empirical Findings on the Informational Content of Dividend Changes

Many models suggest that dividends are costly signals of future profitability. This can explain both why dividends are paid in spite of the tax advantage for capital gains and why announcements of dividend increases are usually accompanied by positive share price reactions. As we have seen in section 2, however, the empirical evidence about the signalling idea is quite mixed.

Dividend Changes and Earnings

This section examines the relationship between dividend changes and changes in earnings. The year of the dividend change is defined as year 0; the previous three years are years -3 to -1, while the following three are years 1 to 3. The sample is based on non-financial, non-utility Swiss companies for which data was available for the period 1982-2003. The resulting sample contains 409 dividend increases, 65 dividend decreases, 44 dividend omissions, as well as 117 cases in which there was no dividend payment following another year without a dividend payment, 25 cases when companies resumed dividend payments and 271 cases when dividends remained unchanged. Since dividend increases are by far the largest group, they are analysed both as a whole and separately for each quintile of dividend changes. The changes in earnings for each group (as well as the changes in several other variables) are compared to the changes for companies that kept dividends constant - these companies form the "control group" in the study. Comparisons to zero are also presented whenever they are relevant (to test, for instance, whether earnings have remained flat between two periods).

Dividends are assigned to year t if they are declared in that particular year (and paid from the net income of year $t-1$). The earnings and cash flow figures are those reported for the year. Total assets for year t are as reported at the end of the year. The change in dividends in computed as

$$\Delta D_{0/1} = \frac{D_0 - D_{-1}}{D_{-1}} \tag{2.4}$$

where D_0 are (split-adjusted) dividends per share announced in year 0 and D_1 are dividends announced in year -1. If there was no dividend payment in the previous year (the denominator is zero), two separate groups are created for companies that resume payments and companies that continue not to pay dividends.

Table 2.6 presents the relationship between dividend changes and changes in earnings per share between years 0 and 1 (all earnings indicators are normalized by total assets per share at the end of year -1). One can see that dividend changes do not seem to predict future earnings growth. Companies that have increased dividends do not seem to grow faster; in fact, the mean and median of their earnings increase is quite similar to that of companies that did not pay dividends in either year. Results are quite similar if one takes the earnings growth between years 0 and 3 or between years 1 and 3 (not reported). There also seems to be no obvious connection between dividend changes and changes in earnings between years -1 and 0 ("current changes"). Indeed, the only strong result is that companies that do not pay any dividends in both year -1 and year 0 have higher current earnings growth.

This is troubling evidence for the idea that companies that increase dividends do this in order to signal higher earnings growth in the future. Although surprising, the result does confirm previous findings. In their study based on US data, Benartzi, Michaely and Thaler (1997) show that dividend changes are connected with past and to some extent current earnings changes, but there is no significant relationship with future movements in earnings.

A look at the Swiss data confirms the strong relationship between past earnings and dividend changes. Table 7 shows that the different groups registered markedly different earnings changes

Table 2.6: Dividend changes and future earnings changes

The table presents the relationship between changes in dividends per share and changes in earnings per share between years 0 and 1, normalized by total assets per share at the end of year -1. Observations are grouped according to the sign and size of the change in dividends per share: omissions, continued omissions (when no dividends are paid following a dividend omission), renewed payments, decreases, no change and the quintiles of dividend increases. The mean and median earnings changes for each group are then compared to one and to their counterparts from the no change group.

Type	Mean	Median	p-value, mean compared to 0	p-value, mean compared to the no change group	p-value, median compared to the no change subsample (Wilcoxon)	p-value, median compared to the no change subsample (χ^2 test)
Omissions	0.06708	0.01208	0.1440	0.1413	0.0606	0.1858
Continued omissions	0.00711	0.00692	0.3024	0.2138	0.0406	0.1504
Decreases	0.00346	0.00237	0.5556	0.4907	0.8892	0.8902
No change	-0.00363	0.00187	0.4553			
Increases:						
Q1	0.00999	0.00606	0.0278	0.1323	0.0625	0.0754
Q2	0.00916	0.00506	0.2853	0.2029	0.4047	0.1197
Q3	0.00309	0.00571	0.6636	0.4848	0.3138	0.1972
Q4	-0.00773	0.00058	0.1921	0.6629	0.2900	0.5266
Q5	-0.00680	0.00004	0.3293	0.7403	0.6490	0.4673
All increases	0.00157	0.00350	0.6006	0.3348	0.4747	0.3086
Resumed payments	0.00126	0.00449	0.9199	0.7651	0.8662	0.8344

	p-value, mean	p-value, median (Wilcoxon test)	p-value, median (χ^2 test)
Increases vs. decreases	0.8099	0.7640	0.5044
Increases vs. resumed payments	0.9804	0.6292	0.8368
Resumed payments vs. continued omissions	0.7141	0.2451	0.5086

between years -2 and -1. (It is perhaps useful to keep in mind that earnings for year -1 actually belong to the same annual report as dividends declared in year 0). Dividend decreases and omissions are associated with significant earnings decreases. Dividend increases are associated with earnings increases and the median of the earnings changes increases for each successive quintile. For the group of companies that do not change their dividends, earnings actually decrease from year -2 to year 1. (The mean is significantly negative at a 5% level. One should be careful however when interpreting the results of the mean tests, since most of the series used in this section are far from being normal and outliers seem to be a problem.) Thus nonparametric tests for the equality in medians should be more accurate and are used throughout the section.

Companies that resume dividend payments also enjoy a significant increase in earnings. The only exception to the rule is that of companies that did not pay dividends in either year -1 or year 0 the non-payment decision comes in spite of a significant earnings increase.

To sum up, dividends seem to "predict" the past rather than the future. This challenges the idea that dividend increases are good news because they are a (costly) signal for faster subsequent earnings growth.

There may be however other mechanisms that make dividend changes good or bad news. One possibility is that dividend changes become informative due to manager's reluctance to decrease dividends.

In his classical study, Lintner (1956) wrote that the dividend policy of his time was characterised by "inertia and conservatism" and that "most managements sought to avoid making changes in their dividends that might have to be reversed within a year or so". Almost half a century later, Brav, Graham and Michaely (2004) conducted a survey of 384 financial executives of US firms and found that 94% of managers try to avoid reducing dividends (this is the highest score in their survey). 88% agree that there are negative consequences to 15 reducing dividends, while 78% are reluctant to make a dividend decision that might need to be reversed.

In their paper, Brav et al. (2004) also report that 90% of managers in their sample say they smooth dividends. They conclude that the managers' perception is that "there is not much reward in increasing dividends but there is perceived to be a large penalty for reducing dividends." A casual look at the Swiss sample suggests that this pattern is to be confirmed. Table 8 presents the dividend changes in year 0 and the corresponding dividend changes in the previous and following years. Dividend increases are gradual: about 60% of dividend increases are associated with at least a previous or a following increase. When dividends are omitted, there is no dividend payment in three quarters of the following years. This persistence is confirmed by the data on years without dividend payments following dividend omissions. Just like in studies based on US data, dividend increases and years when dividends are not changed vastly outnumber years with dividend decreases and omissions. This pattern can be associated with the investors' preference for successive small positive surprises and isolated large negative surprises, as suggested by Shefrin and Statman (1984).

Dividends may thus become informative about earnings in a way not envisaged in classical signalling models. Since managers want to avoid dividend decreases, they will only increase dividends when they are reasonably sure that there has been a sustainable increase in earnings. They will

Table 2.7: Dividend changes and past earnings changes

The table presents the relationship between changes in dividends per share and changes in earnings per share between years -2 and -1, normalized by total assets per share at the end of year -1. Observations are grouped according to the sign and size of the change in dividends per share: omissions, continued omissions (when no dividends are paid following a dividend omission), renewed payments, decreases, no change and the quintiles of dividend increases. The mean and median earnings changes for each group are then compared to one and to their counterparts from the no change group.

Type	Mean	Median	p-value, mean compared to 0	p-value, mean compared to the no change group	p-value, median compared to the no change subsample (Wilcoxon)	p-value, median compared to the no change subsample (χ^2 test)
Omissions	-0.03851	-0.00104	0.0228	0.0000	0.0001	0.0037
Continued omissions	0.03245	0.00481	0.0247	0.0003	0.0002	0.0057
Decreases	-0.10919	-0.00624	0.0013	0.0790	0.0332	0.0038
No change	-0.00365	-0.00104	0.0510			
Increases:						
Q1	0.00611	0.00421	0.0235	0.0080	0.0000	0.0000
Q2	0.00308	0.00521	0.0791	0.0592	0.0000	0.0000
Q3	0.00946	0.00779	0.0000	0.0002	0.0000	0.0000
Q4	0.00964	0.00957	0.0028	0.0006	0.0000	0.0000
Q5	0.00296	0.01789	0.0000	0.0000	0.0000	0.0000
All increases	0.01161	0.00705	0.0000	0.0000	0.0000	0.0000
Resumed payments	0.00174	0.01029	0.0759	0.0020	0.0005	0.0066

	p-value, mean	p-value, median (Wilcoxon test)	p-value, median (χ^2 test)
Increases vs. decreases	0.0000	0.0000	0.0000
Increases vs. resumed payments	0.3552	0.3101	0.1493
Resumed payments vs. continued omissions	0.6303	0.5486	0.1230

Table 2.8: Dividend payments over successive years

Previous year	Base year	Next year
Dividend decreases: 4 Resumed payments: 6 No change: 22 Dividend increases: 12	Dividend omissions: 44	Continued omissions: 33 Resumed payments: 11
Dividend omissions: 33 Continued omissions: 84	No payments following omissions: 117	Continued omissions: 93 Resumed payments: 24
Dividend omissions: 6 Continued omissions: 19	Resumed payments: 25	Dividend omissions: 2 Dividend increases: 15 No change: 8
Dividend decreases: 10 No change: 20 Dividend increases: 23	Dividend decreases: 65	Dividend decreases: 10 No change: 23 Dividend increases: 17 Omissions: 5
Dividend decreases: 25 No change: 115 Dividend increases: 105 Resumed payments: 6	No change: 271	Dividend decreases: 22 No change: 121 Dividend increases: 103 Dividend omissions: 24
Dividend decreases: 22 No change: 105 Dividend increases: 240 Resumed payments: 16	Dividend increases: 409	Dividend decreases: 40 No change: 97 Dividend increases: 257 Dividend omissions: 15

also cut or omit dividends only when the firm's earnings position has deteriorated considerably. As a result, a dividend increase will follow a period of significant earnings growth and confirm that the new, higher level of earnings is persistent. At the same time, dividend decreases will follow a slowdown and confirm that the firm will still be in a difficult position in the future. Indeed, although their study seriously challenges the role of dividend changes as a signal for future earnings, Benartzi, Michaely and Thaler (1997) find that earnings are less likely to decrease following dividend increases.

One way to check the validity of this hypothesis is to look at the difference between the mean levels of earnings before and after the dividend change. Table 9 presents the result of this comparison. One can see that dividend increases are associated with significant positive shifts in the mean level of earnings. This result is supported by the large majority of the significance tests for each quintile of dividend increases. The difference between the sample of firm-years with dividend decreases and the sample with dividend increases is also quite significant. This result is all the more interesting since the dividend increase group only has significantly higher growth between years -3 and 2 and -2 and -1 (for years $-1 > 0$, the difference is only significantly larger for the Wilcoxon test). Thus, although the period of remarkable growth is in the past, a dividend increase seems to guarantee that this growth will not be reversed in the medium term.

The mean and median of the earnings change for the group of dividend decreases are negative, and the 2 test even suggests significance. However (and although one may claim that insignificance is mainly due to the small size of the subsample of dividend decreases), results do not strongly imply a shift for the worse when dividends go down. Indeed, in the case of dividend omissions the mean and median are both positive, although the difference in earnings is not significantly different from zero or from the change of the benchmark constant dividend group.

Thus the bad news contained in the dividend decrease may be that the difficult times for the company will continue in the future and that the firm's management is no longer able to smooth dividends. One can look at the profitability of these companies and compare it to that of the other firms. Table 10 shows that profitability is indeed lower for companies that decrease, omit or continue not to pay dividends. It also seems that the gap becomes wider over time for dividend decreases. While the comparison is a rough one given the overlap between the earnings observations, it does suggest a striking pattern. (Moreover, the problem of overlap is more likely to blur differences between observations rather than increase them).

Therefore dividend decreases, omissions and continued nonpayments are a sign that bad times will continue for the company. There may be even a slight worsening of the firm's position in the case of dividend decreases.

Dividend Changes and Cash Flows

It has been argued that earnings numbers are less reliable for Switzerland than for the United States. This may affect the accuracy of the results presented above. One can try to use cash flows as an alternative indicator of firm performance. Cash flow numbers are more difficult to manage than accounting earnings and they are also less likely to be manipulated than headline measures such as

Table 2.9: Dividend changes and changes in average earnings

The table presents the relationship between changes in dividends per share and changes in average earnings per share. The earnings indicator is computed as the difference between average earnings per share over years 1-3 and the average earnings per share over years -3 - -1, normalized by total assets per share at the end of year -1. Observations are grouped according to the sign and size of the change in dividends per share: omissions, continued omissions (when no dividends are paid following a dividend omission), renewed payments, decreases, no change and the quintiles of dividend increases.

Type	Mean	Median	p-value, mean compared to 0	p-value, mean compared to the no change group	p-value, median compared to the no change subsample (Wilcoxon)	p-value, median compared to the no change subsample (χ^2 test)
Omissions: 44	0.01311	0.00898	0.2821	0.1159	0.4266	0.5001
Continued omissions: 117	0.06110	0.03114	0.0000	0.0000	0.0000	0.0000
Decreases: 65	-0.00513	-0.00483	0.3445	0.6794	0.2100	0.0726
No change: 271	-0.00208	0.00139	0.2492			
Increases:						
Q1: 84	0.01201	0.00958	0.0702	0.0464	0.0488	0.0228
Q2: 80	0.00689	0.00840	0.1629	0.1834	0.1758	0.0389
Q3: 82	0.01647	0.01179	0.0137	0.0093	0.0095	0.0108
Q4: 81	0.01369	0.01534	0.0375	0.0027	0.0033	0.0078
Q5: 82	0.02025	0.00978	0.0481	0.0071	0.1882	0.2995
All increases: 409	0.01389	0.01132	0.0000	0.0009	0.0010	0.0097
Resumed payments: 25	0.04830	0.02785	0.1303	0.0005	0.0314	0.0599

	p-value, mean	p-value, median (Wilcoxon test)	p-value, median (χ^2 test)
Increases vs. decreases	0.0219	0.0015	0.0000
Increases vs. resumed payments	0.0213	0.0274	0.0149
Resumed payments vs. continued omissions	0.6538	0.2024	0.8256

Table 2.10: Dividend changes and average earnings

The table presents the relationship between dividend changes and average earnings levels before and after the change. The measure for the previous average earnings is computed as the ratio between the sum of earnings per share for years -3 to -1 divided by total assets per share at the end of year -1. The measure for the future average earnings uses the average earnings per share for years 1 to 3.

			p-value, previous 3 years	p-value, following 3 years
Dividend decreases	Compared to no change	Mean	0.8378	0.5972
		Median, Wilcoxon test	0.5279	0.1236
		Median, χ^2 test	0.2539	0.0726
	Compared to increases	Mean	0.0159	0.0009
		Median, Wilcoxon test	0.0009	0.0000
		Median, χ^2 test	0.0008	0.0000
Dividend omissions	Compared to no change	Mean	0.0000	0.1655
		Median, Wilcoxon test	0.0000	0.0022
		Median, χ^2 test	0.0001	0.0012
	Compared to increases	Mean	0.0005	0.0000
		Median, Wilcoxon test	0.0000	0.0000
		Median, χ^2 test	0.0000	0.0000
Continued omissions	Compared to no change	Mean	0.0000	0.3383
		Median, Wilcoxon test	0.0000	0.0003
		Median, χ^2 test	0.0000	0.0000
	Compared to increases	Mean	0.0000	0.0000
		Median, Wilcoxon test	0.0000	0.0000
		Median, χ^2 test	0.0000	0.0000

earnings per share. Moreover, if managers are mainly concerned with their ability to honour their commitment for regular cash outlays, cash flows may be more important than accounting earnings.

The results using this measure are quite similar to those based on earnings per share. Dividend increases are associated with strong past growth in cash flows; cash flow changes remain positive between years -1 and 0 and 0 and 1, but the growth is not significantly higher than that of the control group. The mean and median of cash flow changes between years -2 and -1 for the group of dividend decreases are both negative. Moreover, companies that decrease, omit or continue not to pay dividends generate significantly less cash relative to their total assets and the gap becomes slightly wider after the dividend change (not reported). Table 11 shows the shift in average cash flows between years -3 to -1 and 1 to 3. Results are at least as strong as those based on earnings. It can also be noted that the performance of companies omitting dividends seems worse if one uses cash flow numbers rather than earnings numbers. There may be an element of earnings management here - the dip in reported earnings between years -2 and -1 is higher in order to make the future rebound more significant. The result will be larger but isolated negative earnings changes and small but frequent positive earnings news, as suggested by Shefrin and Statman (1984). The evidence is however not very strong and this conclusion must remain tentative.

Dividend Changes and Capital Expenditures

It is also interesting to look at the changes in capital expenditures around dividend changes. For instance, if companies generate large cash flows (as it seems to be the case before dividend increases), larger dividends may be an instrument used to reduce or prevent overinvestment. Table 12 shows that capital expenditures increase following dividend increases. At the same time, the capital expenditures of companies that keep dividends constant are basically flat, while the capital expenditures of companies that omit or continue not to pay dividends decrease significantly. For the group of dividend decreasers, the mean and median for the change in capital expenditures are negative, and the median tests suggest this result is significant. Thus a positive (negative) change in dividends seems to be associated with a positive (negative) change in capital expenditures. (This comparison uses a slightly smaller sample because of limited data availability. The missing observations do not seem to be concentrated in any of the dividend change categories and they are unlikely to affect results.)

By having a closer look at the data, one can also see that companies that declare and pay lower dividends in year 0 have had significantly lower capital expenditures in year -1 compared to year -2. Companies that decreased dividends also seem to have done worse, although the difference is not significant. Dividend increasers are basically undistinguishable from the control group. Similar results hold for changes in capital expenditures between years -3 and -2 (the actual numbers are available upon request).

An additional interesting result is that, in a probit regression explaining dividend cuts, a dummy variable for losses has explanatory power over and above that of the relative level of earnings or the earnings changes. These results (available upon request) are in line with the findings of DeAngelo, DeAngelo and Skinner (1992) for a sample of US firms and those of Goergen, Renneborg and Correia da Silva (2003) for a sample of German firms. They come to confirm the managers

Table 2.11: Dividend changes and changes in average cash flows

The table presents the relationship between changes in dividends per share between year 0 and year 1 and average cash flows. The cash flow indicator is computed as the difference between average cash flows per share over years 1 to 3 and -3 to -1, normalized by total assets per share at the end of year -1. Observations are grouped according to the sign and size of the change in dividends per share: omissions, continued omissions (when no dividends are paid following a dividend omission), renewed payments, decreases, no change and the quintiles of dividend increases. The mean and median earnings ratios for each group are then compared to one and to their counterparts from the no change group.

Type	Mean	Median	p-value, mean compared to 0	p-value, mean compared to the no change group	p-value, median compared to the no change subsample (Wilcoxon)	p-value, median compared to the no change subsample (χ^2 test)
Omissions	0.00119	-0.00509	0.9384	0.9544	0.3120	0.3408
Continued omissions	0.02260	0.01760	0.1014	0.0451	0.0018	0.0600
Decreases	-0.00101	-0.00085	0.8600	0.8660	0.3559	0.4898
No change	0.00050	0.00524	0.9037			
Increases :						
Q1	0.01166	0.01584	0.0000	0.2144	0.0093	0.0754
Q2	0.01849	0.02327	0.0006	0.0291	0.0022	0.0047
Q3	0.02826	0.26605	0.0000	0.0007	0.0000	0.0001
Q4	0.01925	0.02519	0.0042	0.0027	0.0012	0.0006
Q5	0.03022	0.01321	0.0061	0.0021	0.0082	0.2995
All increases	0.02153	0.02053	0.0000	0.0001	0.0000	0.0000
Resumed payments	0.05772	0.03228	0.0389	0.0005	0.0158	0.1434

	p-value, mean	p-value, median (Wilcoxon test)	p-value, median (χ^2 test)
Increases vs. decreases	0.0119	0.0002	0.0001
Increases vs. resumed payments	0.0254	0.4068	0.5365
Resumed payments vs. continued omissions	0.3013	0.6918	0.8256
Increases vs. resumed payments	0.0814	0.0026	0.0116

Table 2.12: Dividend changes and changes in average capital expenditures

The table presents the relationship between changes in dividends per share between year 0 and year 1 and changes in capital expenditures per share. The change in capital expenditures is computed as the difference between average capital expenditures per share in years 1 to 3 and -3 to -1, normalized by total assets per share at the end of year -1. Observations are grouped according to the sign and size of the change in dividends per share: omissions, continued omissions (when no dividends are paid following a dividend omission), renewed payments, decreases, no change and the quintiles of dividend increases.

Type	Mean	Median	p-value, mean compared to 0	p-value, mean compared to the no change group	p-value, median compared to the no change subsample (Wilcoxon)	p-value, median compared to the no change subsample (χ^2 test)
Omissions: 33	-0.02728	-0.01174	0.1309	0.0868	0.0613	0.0385
Continued omissions: 82	-0.06295	-0.00970	0.0081	0.0005	0.0009	0.0018
Decreases: 52	-0.00636	-0.00932	0.4147	0.8899	0.0468	0.0315
No change: 197	-0.00505	0.00423	0.2526			
All increases: 342	0.00851	0.00630	0.0001	0.0021	0.0168	0.5529
Resumed payments: 17	0.01172	0.00635	0.0385	0.2677	0.1928	0.4482

	p-value, mean	p-value, median (Wilcoxon test)	p-value, median (χ^2 test)
Increases vs. decreases	0.0185	0.0002	0.0029
Increases vs. resumed payments	0.7411	0.7987	0.8129
Resumed payments vs. continued omissions	0.1479	0.0028	0.0029
Increases vs. Omissions	0.0001	0.0010	0.0021

reluctance to cut dividends a loss is largely a necessary condition for dividend cuts. To sum up the findings of this section, it seems that dividends are increased following sustained growth in terms of earnings and cash flows. While the future performance of dividend-increasing companies is not as impressive, earnings and cash flow remain at a comparatively high level over the medium term. Companies that decrease or omit dividends show a different pattern. Their initial position in terms of their accounting profitability or their capacity to generate cash flows is worse. For companies that omit dividends there is only weak evidence of a limited earnings and cash flow rebound, while for dividend decreases the evolution is slightly negative. Companies that continue not to pay dividends do show some improvement but the situation of all three groups remains worse than that of dividend increasers over the medium term. Moreover, dividend omissions follow two years of sustained decrease in capital expenditures. Years with dividend decreases and zero dividend payments are followed by years with significantly lower capital outlays. Overall, dividend increases seem to be gradual and much more frequent than dividend decreases and omissions. In most cases, companies that omit dividends continue not paying over the following years.

All these elements seem to suggest that managers are averse to dividend cuts, and that they only increase dividends when they are sure that the firm's position has improved in a sustainable way. Thus dividend changes become informative for the future: dividend increases show that the positive past performance will not be reversed over the medium term, and dividend decreases and cuts confirm a relatively poor performance during the following years. This mechanism is to some extent related to the model of Fudenberg and Tirole (1995) who show that when managers are risk-averse and more recent information is more important in assessing their performance, the result will be earnings smoothing. When dividends are introduced in the model, both earnings and dividends are smoothed and both contain information.

Alternative explanations

Agency theory suggests that dividend increases can be used as a way to force managers to distribute idle cash and avoid overinvestment. Thus the fact that dividends increase for cash-rich companies (dividend increases are associated with higher cash flows and cash levels before the dividend change not reported) should not come as a surprise.

Other evidence, however, tends to qualify the agency explanation. Capital expenditures increase following dividend increases, and decrease following dividend decreases and omissions compared to the previous average (This is in line with the findings of Yoon and Starks 1995 and Denis, Denis and Sarin 1995). Moreover, dividend increasers have not had significantly higher increases in capital expenditure over the previous two years, while companies that omit dividends show a significant slowdown over the same period. Thus dividend increases do not follow an investment boom, while dividend cuts and omissions are not associated with subsequent higher investment that may indicate better growth opportunities. Cash flows and and cash levels for dividend increasers remain at a high level and even increase over the medium term.

All this does not mean that agency considerations do not seem to play any role. It may be that dividend increases play a preventive role: given the persistent high cash flows generated by

the company and the higher level of future capital expenditure, dividend increases could be used to as a way to force managers to keep up the firm's performance in the future. Indeed, this pressure may explain why dividend increases happen at all if one accepts the idea of managers' reluctance to commit to higher payments.

The fact that capital expenditures decrease significantly following dividend omissions and decreases is quite striking. Dividends do not seem to be cut in order to take advantage of new and significant growth opportunities. One may think instead that these firms are constrained and are unable to sustain investment on the previous scale. This may be because external funds are expensive. Fama and French (2001) mention the "pecking order theory" when analysing the evolution of dividend policy in the United States over the last decades. Using Italian data, Sembenelli (1993) finds that dividends are increased slowly, over several years, while dividend cuts tend to be much more abrupt. He explains this in terms of "financial hierarchy". External funds are expensive and thus firms will only increase dividends at a moderate pace in order to build financial slack. At the same time, they will decrease dividends quickly in order to avoid cutting investment or losing favourable growth opportunities.

The fact that this relationship can be found based on Swiss data is interesting. Indeed, many authors have claimed that bank-dominated financial systems, such as those in continental Europe or in Japan, allow for a better provision of funds for companies as a result of close long-term relationships between financial intermediaries and their customer. In particular, banks in these countries are supposed to help reduce the costs of financial distress by providing liquidity (see for instance Hoshi, Kashyap and Stern 1990). While this is a widespred view, there are authors that have challenged this view and argued that the positive role of bank relationships in these countries is overstated. An example in this direction is the comprehensive study of Edward and Fischer (1993) that analyses the German financial system. The findings in this paper may be taken to suggest that firms that cut dividends are constrained and that they cannot readily access external funds.

There are however some caveats that should prevent one from looking at the findings in a pure "pecking order" perspective. First, companies that decrease or omit dividends seem to have done rather poorly over the previous years and it is doubtful whether they have many valuable investment opportunities. Thus the lack of support from financial intermediaries may simply be the result of a straightforward decision without too much impact from factors such as asymmetric information. The data also do not fully support the financial hierarchy scenario of Sembenelli (1993): when companies omit dividends, they have already lowered their capital expenditures over the previous two years. Instead of abruptly cutting dividends in order to benefit from valuable investment opportunities, it seems that managers are willing to forego capital expenditures rather than cut dividends. This is in agreement with the results in the survey of Brav et al. (2004) which show that most managers consider maintaining the dividend level at least as important as investment decisions[1] . Thus, while a "pecking order" phenomenon may be part of the story, it is

[1]The statement in Brav et al. (2004) is indeed quite dramatic: "Today, some executives tell stories of selling assets, laying off a large number of employees, borrowing heavily, or bypassing positive NPV projects,

not the whole story.

Grullon, Michaely and Swaminathan (2002) put forward the "maturity hypothesis". They find that the good news contained in dividend increases is not that earnings will increase faster in the future, but that systematic decrease will be significantly lower. Thus, while profitability decreases following a dividend increase, the decrease in risk more than makes up for it. The situation is symmetric for dividend decreases: while there is a profitability rebound, there is also a significant increase in risk. They then argue that dividend increases may be a sign of "firm maturity": as a firm becomes mature - it is less risky and has fewer growth opportunities - it will naturally disburse more cash to its shareholders.

Again, the fact that capital expenditures increase following dividend increases does not fit the "maturity" explanation. Additionally, one may note that the maturity hypothesis does not provide a clear intuition for the meaning of dividend decreases.

At a more basic level, the findings in this paper and those of Grullon, Michaely and Swaminathan are not contradictory. If dividend increases are a sign of lower risk, it is also less likely that the previous good performance of the firm will be reversed in the near future - that is, that the mean of future earnings will be lower. Benartzi, Michaely and Thaler (1997) also find that companies that increase their dividends are less likely to experience earnings decreases. One can indeed note that one interesting item Brav, Graham, Harvey and Michaely (2004) find in their interviews is that some managers view their information as concerning the mean of the distribution of future earnings, while other believe that information conveyance primarily helps resolve uncertainty so is about the second moment of the distribution of earnings.

The pattern of dividend increases and decreases (as well as that of earnings changes) can also be interpreted as a sign that managers try to present their company in a light that makes it attractive to investors' preferences as presented in Shefrin and Statman (1984). After all, dividends and earnings per share are the most visible numbers, at least for small individual shareholders. The recent "catering theory" of Baker and Wurgler (2003) shows that managers are indeed sensitive to investor preferences.

Finally, one should keep in mind that the fact that dividend increases are not a harbinger of faster earnings growth does not necessarily doom the signalling idea. Since the usual signalling models are usually two-period models, one cannot distinguish between faster earnings growth and higher future earnings levels. Indeed, since dividends are usually seen as a signal for permanent earnings, taking averages over several years may actually give a better approximation of permanent earnings. Thus some signalling may also be part of the explanation for dividend changes albeit not the entire story.

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before slaying the sacred cow by cutting dividends." While "heavy borrowing" is not evident in the Swiss sample, managers may indeed give up positive NPV projects in order to avoid negative dividend surprises.

2.6 Conclusions

The paper has examined several features of dividend policy for a sample of Swiss companies. Cross-sectional comparisons show negative relationships between dividend payments and market-to-book ratios, price volatility and leverage, as well as positive relationships with profitability and (to a lesser extent) firm size and institutional holdings. Ownership concentration does not seem to have significant effects. Companies that used repurchases over the recent years were riskier and less profitable than companies choosing dividends. While some of these relationships are expectable, the negative relationship between leverage and dividend payments, the weak influence of ownership structure and the strong influence of price volatility, and the contrast between dividends and repurchases are not obvious results in the light of theory and previous empirical studies and thus are important aspects to note.

The analysis of dividend decisions over time shows that the classical Lintner model of partial adjustment has a rather mixed performance. A look at changes in dividends per share the measure that is usually given the pride of place in annual reports reveals however interesting patterns.

Signalling models suggest that dividend changes predict future profitability. The analysis of the data indicates however that when dividends increase earnings have already increased. There are no obvious signs of faster growth after positive changes in dividends.

Nonetheless, there is evidence that when dividends increase future average earnings will be at a higher level compared to the past. Companies that decrease or omit dividends have been in a difficult position for several years and they will still have inferior cash flows and earnings over the medium term. They will also have significantly lower capital expenditures.

These findings suggest that dividend changes can become informative due to the manager's asymmetric perception of rewards for dividend increases and negative consequences for dividend cuts. Since managers try to avoid cutting dividends until they "have to", and only increase them when they think earnings are sufficient, dividend increases will show that earnings have shifted to a higher level over the medium term, while dividend decreases are a sign that the firm's problems are likely to continue in the following years.

This mechanism can also explain why price volatility is such an important factor in the cross-sectional comparisons. If price volatility is taken to be a sign of uncertainty concerning future earnings, then its strong negative relationship with dividends may mean that managers try to keep dividends at a low level in order to avoid having to cut them in low earnings states. Thus dividend changes can actually be informative, although the mechanism may be different from that considered in classical signalling models. Exploring this hypothesis over larger samples, and perhaps for other countries with different regulatory environments, can be a worthwile area for future research.

Chapter 3

Payout and Investment Decisions under Managerial Discretion

Abstract

In traditional signalling models, high-quality firms can separate themselves from low-quality firms by using their payout policy. Standard agency theory suggests that shareholders will pressure managers to pay out all excess cash in order to avoid overinvestment.

If firms have different investment opportunities, and these investment opportunities are imperfectly known to investors, signalling *à la* Miller and Rock (1985) does not work. Moreover, since the actual amount of *excess* cash is difficult to determine, attempting to induce management to disburse cash can leave the firm with either too much or too little cash available for investment.

The paper examines a framework where managers' incentives are not necessarily aligned with those of the shareholders, and where the investment opportunities of various firms are different and not known by investors. As a result, dividends become an imperfect indicator of firm quality. Looking at payout policy from this angle allows us to explain and reconcile several empirical regularities found in the literature. The role of informed investors, active shareholders and repurchases is also discussed.

3.1 Introduction

In a Miller and Modigliani (1961) type of world, payout policy is irrelevant. The value of a firm is given by its investment projects, and these projects are independent of the amount of cash paid out by the firm to its shareholders. Empirical studies and surveys have consistently shown, however, that both firm managers and investors consider payout policy to be quite important.

On the investors' side, we know that announcements of dividend increases and repurchases are associated with positive and significant share price reactions, while dividend decreases are associated with significant negative price movements.

On the firms' side, it seems that managers are far from being unconcerned with payout policy. A recent survey of US managers by Brav, Graham, Harvey and Michaely (2004) finds that most managers consider payout policy to be at least as important as investment policy. 88% of the managers in the survey say there are negative consequences to reducing dividends - confirming a pattern noticed earlier by Lintner (1956). Moreover, many of them also "tell stories of selling assets, laying off a large number of employees, borrowing heavily, or bypassing positive NPV projects, before slaying the sacred cow by cutting dividends." (Brav et al. 2004)

The corporate finance literature has provided two main explanations for the importance of payout policy. *Agency theory* emphasizes the managers' tendency to overinvest by employing excess cash in negative-NPV projects that bring them private benefits (DeAngelo, DeAngelo and Stulz 2006, Easterbrook 1984). An increase in payout is therefore good news since it reduces the free cash flow available to managers. *Signalling* models show that higher payout can be used by high-quality firms to distinguish themselves from their low-quality counterparts. Firms with less promising prospects will fins it difficult to increase payout because of the cost of additional external capital (Bhattacharya 1979), of having a higher share in a bad firm (John and Williams 1985), or of reducing investment (Miller and Rock 1985).

While the main arguments of both signalling and agency theories are convincing, their empirical record is mixed (Michaely and Allen 2002). It therefore appears important to look at the aspects of corporate life that have not received enough attention in the traditional literature on payout policy.

It can be argued - and a large literature in the area of corporate finance does - that investors have only imperfect information about the investment opportunities of various firms. Assuming imperfect information about investment projects entails some problems for the mainstream theories on dividend policy.

Signalling models such as Miller and Rock (1985) rely on firms having identical investment opportunity sets. In these models, firms with higher (unobservable) current earnings can signal their higher quality by paying higher dividends because the opportunity cost (in terms of reduced investment) is lower in their case. However, if firms have different investment opportunities, and these investment opportunities are not common knowledge, then using payout policy to separate firms of different qualities can become difficult. A firm with less valuable investment opportunities - and hence future earnings - will find it easier to pay higher dividends than a firm with good investment opportunities. The cost of the signal is lower for the low type and dividends are no

longer a perfect indicator of firm quality.

Agency theory implies that shareholders will pressure management to disburse excess cash. If the firm's investment opportunities are only roughly known to investors, there is the risk that forcing management to pay high dividends, for instance, will lead to the loss of valuable investment opportunities. This is analogous to the trade-off between overinvestment and underinvestment described in the literature on capital structure (Stulz 1990).

The present paper looks at payout policy when the firms' investment opportunities are not perfectly known by investors. In this framework firms can pay higher dividends not just because they have excess cash, but also because they have forgone valuable investment opportunities in order to boost the current share price.

While higher dividends are still associated with a higher average firm quality, the same level of dividends is adopted by firms with different prospects. Managers of firms with valuable investment opportunities weigh the relative benefits of undertaking their projects - and improving long-term performance - and those paying higher current dividends. As a result, some valuable investment opportunities will be lost. The total loss in investment will be higher the lower the returns on investment projects, the lower the weight put by managers on future compensation, and the less widespread the investment opportunities in the economy.

Looking at payout policy from this angle allows us to explain several important empirical regularities. It shows why small firms - which are faced with the highest problems in terms of information asymmetry - often choose not to pay dividends: the opportunity cost in terms of forgone investment is usually higher in their case. This aspect is ignored if one assumes that all firms have the same production function.

Asymmetric information implies that, unlike in the Miller and Modigliani (1961) framework, the payout and investment policies of various firms are connected. When investment opportunities are more widespread, investors are less wary of low dividends and investment becomes more likely: there is "strength in numbers". This mechanism sheds some light into the phenomenon of "disappearing" (Fama and French 2001) and "reappearing" (Julio and Ikenberry 2004) dividends. It also provides an explanation for the "catering" for investment preferences noted by Baker and Wurgler (2004). Indeed, while "catering" has been criticized by Hoberg and Prabhala (2004), who emphasize the importance of idiosyncratic risk, it may well be that the two competing stories largely describe the same feature of dividends policy.

The model considers both pure and mixed strategies available to managers. Looking at mixed strategies allows us to examine the situation of partial investment - firms decide to invest only some of the time or only some of the firms invest. This situation may indeed have the highest intuitive appeal. The paper analyzes the factors that influence the probability of investment. It can be shown that unstable low-investment equilibria are also possible. A small "push" from investors in terms of more favorable share prices for low dividends is enough to shift firms to higher investment and increase firm value. This may explain why investors can be happy with a dividend policy that does not distribute away all excess cash. Indeed, while large amounts of dividends are paid every year - and without them agency problems would be huge (DeAngelo, DeAngelo and Stulz 2004), firms are far from paying all their free cash flows to shareholders (DeAngelo and DeAngelo 2006).

As we have already seen, managerial self-interest can lead to distorted investment. One may expect that there are ways to alleviate this problem by adjusting managerial incentives. The ones who can make these adjustments are existing shareholders. It is thus important to note that current shareholders may be just as interested as managers in boosting the current share price if they intend to sell their shares in the short run. Therefore the mechanism that is meant to reduce distortions may work less than perfectly. Indeed, at least theoretically, one can contemplate the situation where managers are more "conservative" (i.e., more willing to invest) than shareholders themselves.

Introducing informed investors to the model reduces distortions, since prices will be more closely aligned to the true value of each firm. However, the distortions are not necessarily eliminated. This is because - unless they aim to take control of the firm and force management to make the right decisions - informed investors are interested in potential trading profits. The main source of these profits is the variability in firm values, not the increase in firm value, which is shared with uninformed investors. Since firms that pay excessive dividends are overpriced in the model, the provider provides a tentative explanation for the mismatch between the empirical findings of Grinstein and Michaely (2005) and the implications of the model in Allen, Bernardo and Welch (2000).

The remainder of the paper is structured as follows: Section 2 presents a brief overview of the literature on corporate payout policy, Section 3 presents the basic model in the case of uninformed investors, Section 4 introduces potentially informed investors, and Section 5 concludes.

3.2 Literature review

In the Miller and Modigliani (1961) framework, dividends are irrelevant. The value of the firm is given solely by its investment opportunities, and dividends are just the residual. Firms can attract additional funds at the appropriate cost, and investors faced with consumption shocks can get their own "homemade dividends" by selling some of their shares.

We know however that dividend increases and decreases are associated with significant share price reactions (Aharony and Swary 1980, Denis, Denis and Sarin 1994, Nissim and Ziv 2001). It seems therefore that investors interpret higher dividends as signs of higher firm quality. Researchers have tried to explain this stylized fact based on departures from the Miller and Modigliani assumptions. Dividends can alleviate agency problems by reducing the free cash flow available to managers and keeping firms in the capital markets (Easterbrook 1984, DeAngelo, DeAngelo and Stulz 2005). At the same time, dividends can benefit shareholders at the expense of debtholders, although this conflict does not seem to be very important in practice (Handjinicolaou and Kalay 1984). Signalling models argue that dividends are costly - and therefore credible - indicators of firm quality (Bhattacharya 1979, John and Williams 1985, Miller and Rock 1985, Allen, Bernado and Welch 2000). Dividend clienteles (Bajaj and Vijh 1990, Allen, Bernado and Welch 2000) and behavioral features (Shefrin and Statman 1984) have also been put forward as explanations of dividend policy.

Empirically, results on the various theories have often been mixed. Lang and Litzenberger (1989) and DeAngelo, DeAngelo and Stulz (2004) show the importance of agency problems in divi-

dend policy. Denis, Denis and Sarin (1994) and Yoon and Starks (1995), however, reject the claims of Lang and Litzenberger (1989) and favor signalling explanations for dividends. The relationship between dividends and earnings - as implied by signalling models - has been (weakly) supported by Penman (1983), Nissim and Ziv (2001) and (strongly) challenged by Benartzi, Michaely and Thaler (1997) and Grullon, Michaely, Benartzi and Thaler (2005). Grullon, Michaely and Swaminathan (2002) suggest that dividend changes contain information about risk rather than about future earnings (the "maturity hypothesis"). The importance of taxes is also a matter for debate (Bernheim and Wantz 1995, Michaely and Murgia 1995, Hubbard and Michaely 1997, Amihud and Murgia 1997).

The proportion of dividend-paying firms tends to fluctuate over time. Fama and French (2001) show that the propensity of firms to pay dividends decreased significantly since 1978, and especially in the 1990s. Julio and Ikenberry (2004) document a rebound in the number of dividend payers since 2000.

Baker and Wurgler (2004) show that the propensity to pay dividends is related to the difference in the market-to-book ratios of dividend-paying and nonpaying companies. Their "catering" theory argues that investors prefer dividends more in some periods than in others and that firm managers respond to these preferences. Hoberg and Prabhala (2005) dispute this and show that after controlling for idiosyncratic risk the indicator of investor preferences has no additional explanatory power.

Allen, Bernardo and Welch (2000) connect the idea of tax clienteles with that of signalling/ monitoring. Higher dividends imply higher tax costs for individual investors, but not for institutional ones. Since institutional investors are better monitors or are simply better at identifying good firms, dividends can be used to separate firms of different quality and higher dividends will be associated with higher institutional shareholdings. Grinstein and Michaely (2005) however find that, while institutional investors are more likely to invest in dividend-paying companies, there is actually a weakly negative relationship between the size of dividend payments and institutional ownership.

The usual signalling models imply that firm quality can be clearly distinguished based on the dividends they pay. Departing from the idea that dividends are perfectly correlated with firm quality allows us to get a more nuanced and likely more realistic picture of dividend policy. Kumar (1988) also builds a model where dividends are only rough indicators of earnings. The existence of the coarse equilibrium - and the non-existence of the pure signalling equilibrium - is generated in that model by the different risk aversion of managers and shareholders. In the current model, agents are risk-neutral and the main problem is that of asymmetric information.

3.3 The Model

Unlike previous models on dividends, we look at the situation where investors are uncertain about the true investment opportunities. We claim that this assumption is realistic and that it can be helpful in understanding several important stylized facts which are difficult to understand in light of existing theory.

In a world where all firms have the same investment opportunities, dividends can be used as a precise signal for the firm's current (and potentially future) earnings - as shown in Miller and Rock (1985). Since firms have the same source of costs and benefits from dividend payments, firms with higher earnings will be able to pay higher dividends and distinguish themselves from firms with lower earnings.

If firms have different investment opportunities (and these opportunities are difficult to assess by outside investors), dividends become an imperfect indicator of a firm's future prospects. Firms that pay lower dividends because they decide to invest in positive NPV projects face the risk of being pooled with low-paying firms that do not have valuable growth opportunities. At the same time, deciding not to invest in some positive-NPV projects will leave the firm with more cash available for paying dividends. While the long-term prospects of the firm will be affected, the current share price of the firm will be relatively high.

Forgoing potentially valuable investment opportunities is obviously inefficient from a social point of view. However, the compensation of a firm's management is often tied to the share price and managers thus have an obvious incentive to boost the current share price. This particular behavior may not be so strongly opposed by shareholders - especially if a large share of them expect to have to sell their shares in the near future.

It can be argued that the managers' (and shareholders') time horizon is not extremely short and that important and visible positive NPV investment projects will be easily undertaken. However, there will still remain significant informational asymmetries between management and investors concerning the true extent and quality of projects available to the firm. The incentive to distort the firm's investment policy in order to increase the current share price will be higher if

- the investment project is less "visible", or more difficult to assess by outside investors. A large investment in physical assets will be much easier to observe than small diffuse measures that increase the operating efficiency of existing processes within the firm. Some projects - for instance the research for new drugs or new software products - may be difficult to evaluate by the ordinary private investor.

- the firm is diversified or large and has many different investment opportunities in various areas;

- the firm's shares are held by many small investors. These investors may not have the expertise to assess the prospects of the various investment projects. Their shareholdings may also be too small to provide them with the incentive to monitor the firm very closely.

The vast majority of dividends tend to be paid by large firms (DeAngelo, DeAngelo and Skinner 2004). With a few exceptions, these firms are widely held. Moreover, the number of potential investment projects for these firms is quite high, and it may be difficult for the investors to get a precise picture. This can compensate for the larger number of analysts following these firms.

We present below the setup and the results for the model without informed investors then compare the findings to the case where some investors can acquire information. The finding in each subsection are discussed in light of existing stylized empirical facts.

3.3.1 The Case of Uninformed Investors

A. The basic setup

Types of firms. The model has two main *types* of firms:

- firms that have valid growth opportunities;
- no-growth firms that produce a constant cash flow every period.

Information. Managers know the type of their firm; the firms' shareholders, as well as outside investors, however, are unable to evaluate each firm's growth opportunities. They only know the proportion of each type of firm in the total population. Current dividends are by definition a "free" piece of information that can easily be used by any investor.

Risk neutrality Both investors and managers are *risk neutral*[1]. Both groups also discount future cash flows, possibly at different rates.

Payout and investment There are *large numbers* of firms of each type. As a result, if a firm with a valid investment project decides to undertake the project and pay lower dividends, there will be at least some no-growth firms with the same level of dividends. If the project is not undertaken and the firm can pay higher dividends, there will again be no-growth firms that pay the same amount.

More precisely, if the firm undertakes the investment project, it will be able to pay d in the first period and $D' > d$ in the second period. There will be other, no-growth firms that also pay d both in the first and the second period. If the manager decides to forgo the investment opportunity, the dividend will be $D > d$ at $t = 1$ and d at $t = 2$. There are also no-growth firms that pay dividends equal to D in both periods[2].

Investment is supposed to be *efficient* from a social point of view - the "true" value of the firm is higher if the project is undertaken. The condition that expresses this is

$$d + \delta D' > D + \delta d.$$

It can be seen that the condition implies that $D' > D$.

One could also consider the (simpler) case where the firms with growth opportunities that do not invest pay equal dividends in both periods. However, the extra cash on the balance sheet is

[1] Introducing risk aversion would worsen the issue of forgone investment. We show however that there is a problem even under risk neutrality.

[2] One can also consider the case of a continuum of firms with various investment opportunities. Results are not fundamentally different in that case; having two types of firms has the additional advantage of allowing us to better disentangle investment returns and the proportion of firms undertaking investment, as it will be seen below.

likely to be easily observable by shareholders and they will ask for higher dividends in order to avoid free cash flow problems. Cash flows next period are likely to be lower due to the lack of investment, and - without cash reserves from the previous period - the dividends will follow suit. Existing empirical evidence also appears to lend support to this assumption. Grullon, Michaely and Swaminathan (2002) find that dividend increases follow periods of high growth in capital expenditures, while dividend decreases follow sharp declines. [3] Moreover, as it will be seen in the following subsection, our assumption allows us a more straightforward analysis of the situation of partial investment. For simplicity, the lowest level of dividends in the model (d) will be usually normalized to 0.

The proportion of firms with growth opportunities in the total population is β, while the proportions of no-growth firms paying d and D respectively are equal to α (thus $2\alpha + \beta = 1$). While investors do not know the precise growth opportunities of each individual firm, they are aware of the overall distribution of growth opportunities - that is, they know α and β.

Dividends after $t = 2$ are assumed to be constant and equal to C for all firms (as an approximation, one may think that neither managers nor investors can produce a very precise and differentiated dividend forecast far into the future). The three groups of firms and their dividends are illustrated in Figure 1.

Observed dividends and share prices. At $t = 1$, managers decide on the dividend and investment policy, and firms pay the first round of dividends. Investors observe the dividends announced by each firm and share prices are formed as the discounted sum of future dividends:

$$P_1 = \text{Div}_1 + \delta \text{Div}_2 + \delta^2 \frac{C}{1-\delta}$$

where Div_1 are dividends paid in the first period, Div_2 are the (expected) dividends paid in the second period, and δ is the discount factor for future cash flows.

Managerial compensation. The managers' compensation consists of a bonus proportional to the current share price that is paid each period. [4] Managers discount future compensation at the rate m. Thus the managerial payoff can be written as:

[3] There is also a well-documented negative relationship between growth opportunities (measured by the market-to-book ratios and asset growth rates) and dividend payments (see for instance Fama and French 2001, DeAngelo, DeAngelo and Stulz 2004, Hoberg and Prabhala 2004). One should note, however, that this finding concerns growth opportunities *as perceived by the market* or past growth rates, while the model deals with growth opportunities that are not widely known by investors.

[4] Alternatively - and in line with many existing models - one could assume that managers derive fixed private benefits from their position each period and that keeping this position each period depends on raising the value of the firm above a fixed threshold given by the value of the firm under alternative management. A higher value of the firm will increase the perceived probability that the manager's abilities are high and will make dismissal less likely - thus the manager will be able to continue enjoying private benefits. The mechanics of the model in that case are similar.

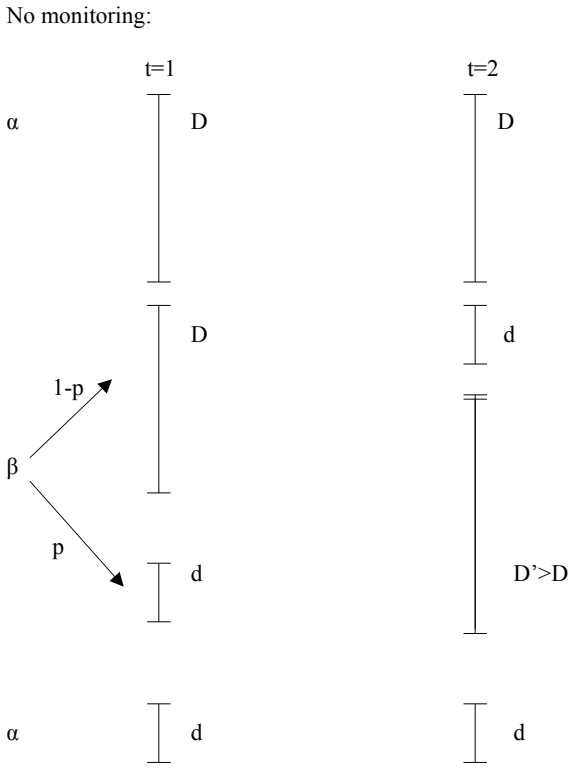

Figure 3.1: The decision problem of firms with growth opportunities: these firms (represented by β) have to decide between paying high dividends D or paying low dividends d and investing.

$$\text{Payoff} = P_1 + mP_2 + m^2 \frac{C}{(1-m)(1-\delta)},$$

where P_t is the share price at time t.

Timing. To sum up, the structure of the basic model is as follows:

1. At $t = 1$, the managers of firms with growth opportunities decide whether to undertake the project. Investors observe dividends and prices are formed on the market. Managers are then compensated based on the market value of the firm.

2. At $t = 2$, the next round of dividends is revealed, new prices are formed and managers receive their new compensation. The process will be repeated over future periods.

B. Managers' decision problem and results

Investors will use the dividends announced by each firm in order to form the share prices. Since the actual growth opportunities of each firm are unobservable, investing firms that pay dividends d at time $t = 1$ will be pooled with no-growth firms paying the same amount. Firms that forgo investment and pay high dividends D will also be pooled with firms with constant dividends. The share price of each group will reflect the average value of the firms included in the pool. This quality will be affected by the managers' investment decisions, which in turn are guided by the resulting share prices and their effect on compensation. We consider both pure and mixed strategies for the managers - they can always invest, invest with probability p or never invest.

The managerial decision problem. If managers decide to invest with probability p (where p can also be 0 or 1), the market value at $t = 1$ for a firm paying dividends equal to d will be:

$$P_1^d = d + \delta \frac{\beta p D' + \alpha d}{\beta p + \alpha} + \delta^2 \frac{C}{1-\delta}. \tag{3.1}$$

In the case of a firm that pays D, the value will be

$$P_1^D = D + \delta \frac{\beta(1-p)d + \alpha D}{\beta(1-p) + \alpha} + \delta^2 \frac{C}{1-\delta}. \tag{3.2}$$

It is easy to see these are the updated prices conditional on the observed dividends.

For firms with growth opportunities that invest, the price at $t = 2$ will be given by

$$P_2^d = D' + \delta \frac{C}{1-\delta},$$

while for firms that do not invest the price will be

$$P_2^D = d + \delta \frac{C}{1-\delta}.$$

From $t = 3$ onwards, the price (at least seen from $t = 1$) will be equal to $\frac{C}{(1-\delta)}$.

As we have already mentioned, the manager's payoff function is given by:

$$\text{Payoff} = P_1 + mP_2 + m^2 \frac{C}{(1-m)(1-\delta)}.$$

In order to maximize their payoff, managers can decide in favor of full investment, no investment or partial investment. In a mixed strategy equilibrium where managers invest with probability p (partial investment), the payoff of managers that decide to invest will be

$$\text{Payoff}^d = d + \delta \frac{\beta p D' + \alpha d}{\beta p + \alpha} + \delta^2 \frac{C}{1-\delta} + mD' + m\delta \frac{C}{1-\delta} + m^2 \frac{C}{(1-m)(1-\delta)},$$

while for managers that do not undertake their projects it will be

$$\text{Payoff}^D = D + \delta \frac{\beta(1-p)d + \alpha D}{\beta(1-p) + \alpha} + \delta^2 \frac{C}{1-\delta} + md + m\delta \frac{C}{1-\delta} + m^2 \frac{C}{(1-m)(1-\delta)}.$$

In the mixed strategy equilibrium managers will be indifferent between the two alternatives. Defining the function H as the difference between the payoffs with and without investment,

$$H = \text{Payoff}^d - \text{Payoff}^D = d + \delta \frac{\beta p D' + \alpha d}{\beta d + \alpha} + mD' - D - \delta \frac{\beta(1-p)d + \alpha D}{\beta(1-p) + \alpha} - md,$$

a mixed strategy equilibrium will require $H = 0$. One can also have the pure strategy equilibria of no investment (when $H(p = 0) \leq 0$) and full investment (when $H(p = 1) \geq 0$).

As one can see, the probability of investment - p - appears both in the numerator and the denominator of the ratios included in H. This is because - unlike in other models that focus on mixed strategies, such as Maug (1998) - the randomizing probability chosen by the agent also changes the value of the "average" firm. If more firms decide to invest (p increases), then the value of the average firm paying low dividends increases. At the same time, the value of firms paying high dividends also increases - because there are fewer "shirking" firms in the pool. If fewer firms decide to invest, then the value of low-dividend firms decreases, as well as the value of high-dividend firms. These simultaneous movements mean that we have to analyze in some detail the existence of various equilibria.

A first look at the expression for H - that is, for the difference in the rewards of investing and shirking - allows us to outline to conditions that favor investment:

Proposition 1. The incentives to invest increase if

- the returns on investment (proxied for instance by D'/D) are higher;
- the managers care more about the future: their discount factor (m) is higher;
- investment opportunities are more widespread (β is higher).

Proof See Appendix.

The first two conclusions are intuitively obvious. The last one, however, is more interesting. It says that firms will find it more attractive to invest - and pay lower dividends - if the proportion of firms having worthwhile projects is higher. This is because having more "growth" firms in the high dividend group will depress the price, while having more "growth" firms in the low dividend group will increase it. An increase in the general population of firms that have new positive NPV projects will thus most likely make conditions more favorable for investment - there strength in numbers.

Indeed, we know that positive share price reactions to dividend increases are larger in declining markets (when investors most likely become aware that growth opportunities have become scarcer) (Fuller and Goldstein 2005). This means that the "reward" for high dividends is decreasing in β, as implied by our model.

We now have to analyze the investment equilibria and the circumstances when they occur. To simplify the expressions and provide a better intuition, we normalize d (the lowest level of dividends) to 0 and define $k = D'/D$. This means that k stands for the returns on the investment project. Investment is worthwhile if $k > 1/\delta$. It should be noted that our model allows us to distinguish between the average profitability of individual investment projects (proxied by k) and the abundance of these projects (proxied by β).

The structure of possible investment equilibria depends on the returns on investment k. We detail that structure below.

Proposition 2. If returns are relatively high ($k > \left(1 + \frac{\beta}{\alpha}\right)^2$), then

- If

$$k\Big(\frac{\delta\beta}{\beta+\alpha} + m\Big) > 1 + \delta$$
$$mk < 1 + \frac{\alpha\delta}{\alpha+\beta}$$

(i.e., returns are "high, but not extremely high", or the manager's discount factor is low), there is a mixed strategy equilibrium with partial investment, as well as the equilibrium of full investment. The mixed strategy equilibrium is however unstable.

- If

$$k\Big(\frac{\delta\beta}{\beta+\alpha} + m\Big) > 1 + \delta$$
$$mk > 1 + \frac{\alpha\delta}{\alpha+\beta}$$

there is only a pure strategy equilibrium (always invest).

Proof See Appendix.

The possible equilibria in the case of high returns can be seen in Figure 2.

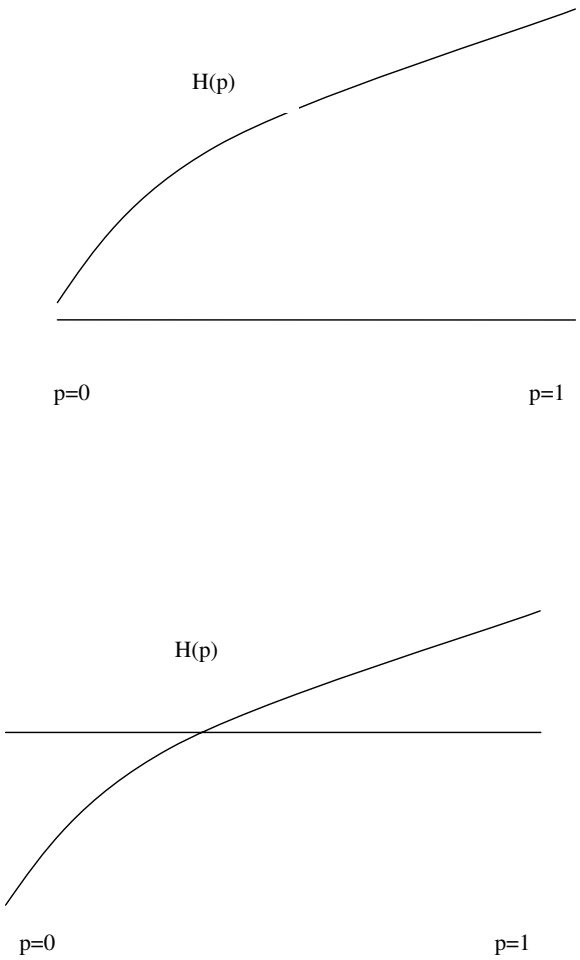

Figure 3.2: Possible equilibria for high returns k

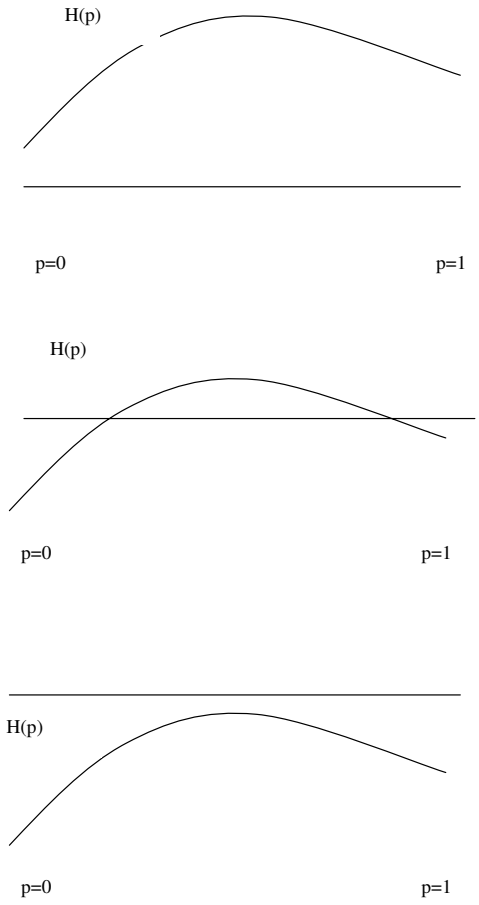

Figure 3.3: Possible equilibria for low returns k

If returns are high, conditions are reasonably favorable to investment. The more interesting case is that of projects with relatively low returns. Indeed, if investment returns are high, one could imagine that the managers could contact a financial intermediary and obtain the necessary funds;

they would therefore not have to resort to cutting dividends for this. However, if the returns on investment are lower (but still positive), the additional costs of financial intermediation may make this option unfeasible.

Proposition 3. If $k < (1 + \frac{\beta}{\alpha})^2$:

- If

$$k\Big(\frac{\delta\beta}{\beta+\alpha} + m\Big) > 1 + \delta$$
$$mk > 1 + \frac{\alpha\delta}{\alpha+\beta}$$

there is only one pure strategy equilibrium (always invest).

- If

$$k\Big(\frac{\delta\beta}{\beta+\alpha} + m\Big) > 1 + \delta$$
$$mk < 1 + \frac{\alpha\delta}{\alpha+\beta}$$

one can have both pure strategy equilibria (always invest and never invest), and an unstable mixed strategy equilibrium with partial investment.

- If

$$k\Big(\frac{\delta\beta}{\beta+\alpha} + m\Big) < 1 + \delta$$
$$mk < 1 + \frac{\alpha\delta}{\alpha+\beta}$$

and $H(p = \frac{\beta k+\alpha k+\alpha-\sqrt{k}}{\beta(k-1)}) > 0$, then there are two mixed strategy equilibria, as well as the pure strategy equilibrium of no investment (which gives the manager a lower expected payoff than either of the mixed equilibria with partial investment).

Proof See Appendix.

The possible equilibria in the case of low returns can be seen in Figure 3.

The multitude of possible equilibria warrants explanation. The fist case will occur when returns are relatively high, managers are also interested in future compensation, and investment opportunities are more widespread (β is higher). Rather unsurprisingly, we get the equilibrium with the highest p when conditions are most favorable to investment.

The two following cases are more interesting. The apparently more persistent equilibrium (the one that appears in both cases and that is actually a continuation of the mixed equilibrium in Proposition 2) is actually unstable[5]. That is, if investors make a small mistake in setting prices and make them more or less favorable to investment, managers will follow suit by increasing/ decreasing the probability of investment and the whole system will move towards an alternative equilibrium.

The existence of this unstable and Pareto-dominated equilibrium is actually important. It represents the case when firms can "get stuck" in a low-investment equilibrium and pay high dividends lest they be considered of inferior quality. This is obviously unsatisfactory since it destroys firm value. A small "push" from investors in terms of share prices more favorable to investment - that is, relatively higher prices for low dividends - will cause a switch to an equilibrium where positive fewer positive NPV projects are lost. This may well be explain why - while there obviously is a pressure for managers to disgorge cash (DeAngelo, DeAngelo and Stulz 2004) - investors do seem to be happy with "niggardly" (Miller and Modigliani 1961, DeAngelo and DeAngelo 2006) payouts.

The second mixed strategy equilibrium - which implies a higher probability of investment that the previous one and thus a higher average firm value - is the stable one [6]. In the case of small perturbations managers will tend to move back to the equilibrium. This is the most interesting case for analysis. It is the situation when full investment is not sustainable, because returns are too low or managers are less interested in future compensation (for instance, if they are closer to retirement). This is the equilibrium that will form the focus of the remainder of this section and the following section of the paper.

We can now present some comparative statics results for the mixed strategy equilibrium.
Proposition 4. The probability of investment p is

- increasing in the investment returns k ($\partial p/\partial k > 0$);
- increasing in the managerial discount factor for future compensation m ($\partial p/\partial m > 0$);
- increasing in the proportion of firms with valuable growth opportunities ($\partial p/\partial \beta > 0$).

Proof See Appendix.

[5]It is amixed strategy equilibrium in a game of strategic complementarities (Echenique and Edlin 2002).

[6]The stable mixed equilibrium exists if $H(p_1 = \frac{\beta k+\alpha k+\alpha-\sqrt{k}}{\beta(k-1)}) > 0$ - that is, if

$$k(\delta + \delta\alpha + m) - 2\alpha\delta\sqrt{k} - \alpha\delta - 1 > 0$$

Even if $m = 0$ (managers do not care about the future), this is an equilibrium for high enough β. Thus some investment is sustainable even in adverse conditions (low discount factors) if investment opportunities are widespread enough.

The final relationship - that between p and β - is the most interesting one. We have already seen in Proposition 1 that having more widespread growth opportunities creates better conditions for investment. This is confirmed here: the likelihood of investment is increased if growth opportunities are more widespread. This connection is useful in providing an explanation for several empirical findings.

Fama and French (2001) document that the propensity of US-listed firms to pay dividends decreased significantly during the 1990s. At the same time, Julio and Ikenberry (2004) show an increase in the number of dividend payers since 2000. One may well think that when growth opportunities were quite widespread - in the 1990s, during one of the longest periods of continuous economic growth in US history - lower dividends were a natural consequence, accepted by investors. As recession ensued and growth opportunities were largely perceived to have decreased there was a rebound in dividend payments.

Baker and Wurgler (2004) put forward a measure of investor preferences - the log difference in the value-weighted average market-to-book of payers and the value-weighted average market-to-book ratio of nonpayers - and show that this measure is closely related to the variations in dividend policy outlined by Fama and French (2001). They conclude that during some intervals, investors prefer high growth companies (low-dividend) companies; in other intervals, they look for "safe", high-dividend companies - and that managers respond to these preferences. The model presented in the current paper shows that this is actually the result of rational behavior on the part of both investors and shareholders.

Hoberg and Prabhala (2005) challenge the message of the paper by Baker and Wurgler (2004). They show that when idiosyncratic risk is controlled for there is little explanatory power left for the measure of investor preferences. Our results imply that there may be truth in the claims of both sides. As growth opportunities become more widespread, investors rationally show a higher tolerance for lower dividend payments, and the ratio of market-to-book measures will shift accordingly. At the same time, there are more valid investment projects around *and* more of them are undertaken - and this may well increase risk, as noted by Hoberg and Prabhala (2005).

A final important thing to note about the equilibrium is that the initial price for high-dividend firms (P_1^D) is larger than the price for low-dividend firms (P_1^d)[7]. Thus, although the starting point of the model is that high dividends can be "bad" and low dividends can be "good", in equilibrium one does not get the rather counterintuitive result of firms that pay higher dividends and command lower prices.

3.3.2 Introducing Informed Investors

The previous section has assumed that investors are unable to acquire information about the investment opportunities available for each particular firm. One can imagine however that at least some investors will have the ability and the incentives to obtain more accurate information about

[7]This can be easily seen by comparing the conditions for $H = 0$ and $P_1^D = P_1^d$. The prices are only equal in the extreme case of $m = 0$ - i.e., the manager does not care at all about the future

the true quality of the firms. This section deals with the case where informed investors acquire costly information about the actual state of the particular companies and use it on the market.

Two new players are added to the model. One of them is a *monopolistic informed investor* along the lines of Kyle (1985). This investor can obtain information at a fixed cost c per firm. The other is the risk-neutral, competitive *market maker*.

At $t = 1$ a share x of the firm is owned by the potentially informed investor and the remaining part is owned by a continuum of small investors. With probability $\frac{1}{2}$ small investors are faced with a liquidity shock at $t = 1$ and have to sell ϕ of their shares. Therefore the total expected proportion of a firm's shares brought to the market by uninformed investors is $\frac{1}{2}\phi(1 - x)$. Unlike the small uninformed investors, the large investor is not subject to liquidity shocks.

The timing is as follows. At time 1, managers decide on their investment and dividend policy. Once dividends are announced, the large investor decides whether to monitor. Shares are then traded on the market. Both the informed investor and the uninformed investors that face a liquidity shock submit their orders. The market maker observes the order flow and sets the price so as to break even[8]. The manager receives the compensation based on the initial share price. At time 2, the new dividend is paid out, the new price is formed, and the management and the shareholders receive their final payoffs.

The model assumes that the potentially informed investor is unable or unwilling to take over the firm and enforce the first-best investment policy. This assumption is most likely to hold if the firm is large. Admati, Pfleiderer and Zechner (1994) illustrate the limitations of large shareholder activism.

Monitoring provides the informed investor with the opportunity to realize *trading gains*. She will sell the shares of overvalued firms and buy those of undervalued firms in each "pool". However, the trading gains will only materialize if the market maker is unable to distinguish between the order flows generated by informed and uninformed investors. The informed investor will therefore have to "camouflage" her orders. This can be achieved by buying shares of undervalued companies when a liquidity shock occurs and selling shares of overvalued companies where shareholders were not faced with a liquidity shock. If the amounts to be bought and sold are x_B and x_S, the relationship that has to be satisfied is

$$x_b + 0 = x_S + \phi(1 - x)$$

As in Maug (1998), we consider the symmetric case where $x_b = -x_s = \frac{1}{2}\phi(1 - x) \equiv u$. Taking values of x_B and x_S that are not equal in absolute value does not change the essence of the main results.

The informed investor decides to monitor with probability q firms that pay high dividends and with probability s firms that pay low dividends. The possible market outcomes are presented in Table 1.

[8]The market setting is similar to that in Kyle (1985) and Maug (1998).

[INSERT TABLE 1 ABOUT HERE]

Proposition 5.

- Monitoring high-dividend firms is worthwhile if

$$\frac{1}{2}\phi(1-x)\delta\alpha\beta q\frac{D-d}{(\beta(1-p)+\alpha)^2} > c.$$

- Monitoring low-dividend firms is worthwhile if

$$\frac{1}{2}\phi(1-x)\delta\alpha\beta p\frac{D'-d}{(\beta p+\alpha)^2} > c.$$

Proof See Appendix.

Thus monitoring becomes more attractive if shares are more liquid (ϕ is higher), the share of the firms owned by the uninformed investors is larger, the discount factor δ is higher (i.e., the market puts higher weight on future cash flows), and the higher the gap between the actual cash flows of undervalued (investing) and overvalued (no-growth) firms ($D'-d$). Analogous relationships hold for the group of high-dividend firms.

Depending on the parameter values, we can have the situation where just the high- or low-dividend groups are monitored, when neither of them is monitored or when both of them are attractive to the informed investor.

Now that we have the outline of the possible market outcomes, we can reconsider the dividend and investment choices of firm managers. If the low- and high-dividend groups are respectively monitored the expected initial prices for investing/ shirking managers are:

$$E(P_1^{invest}) = d + \frac{1}{2}\delta D' + \frac{1}{2}\delta\frac{\beta pD' + \alpha d}{\beta p + \alpha} + \delta^2\frac{C}{1-\delta}$$
$$E(P_1^{noinvest}) = D + \frac{1}{2}\delta d + \frac{1}{2}\delta\frac{\alpha D + \beta(1-p)d}{\alpha + \beta(1-p)} + \delta^2\frac{C}{1-\delta}$$

One can see by comparing with equations (1) and (2) that prices are brought more in line with the actual values of individual firms. This suggests that managers will have higher incentives to invest. One can summarize the managers' tradeoff when both types of firms are monitored as follows:

$$\text{Payoff}^{invest} = d + \frac{1}{2}\delta D' + \frac{1}{2}\delta\frac{\beta pD' + \alpha d}{\beta p + \alpha} + \delta^2\frac{C}{1-\delta} + mD' + m\delta\frac{C}{1-\delta} + m^2\frac{C}{(1-m)(1-\delta)}$$

$$\text{Payoff}^{noinvest} = D + \frac{1}{2}\delta d + \frac{1}{2}\delta\frac{\beta(1-p)d + \alpha D}{\beta(1-p) + \alpha} + \delta^2\frac{C}{1-\delta} + md + m\delta\frac{C}{1-\delta} + m^2\frac{C}{(1-m)(1-\delta)}$$

$$H = \text{Payoff}^{invest} - \text{Payoff}^{noinvest} = d + \frac{1}{2}\delta D' + \frac{1}{2}\delta\frac{\beta pD' + \alpha d}{\beta d + \alpha} + mD'$$

$$- D - \frac{1}{2}\delta d - \frac{1}{2}\delta\frac{\beta(1-p)d + \alpha D}{\beta(1-p) + \alpha} - md$$

The payoff for investing increases, while the payoff for not investing decreases, and thus in equilibrium we will have $H = 0$ for a higher value of p (H is decreasing around the equilibrium point).

It may be important to note however that even the presence of full monitoring may not be enough to switch firms from the no-investment equilibrium to partial or full investment - while the informed investor still makes positive profits on her trades. If this happens, monitoring costs are wasted from a social point of view. This is because - as noted in Maug (1998) - the informed investor makes profits from trading with uninformed investors. The source of these trading profits is the *variability* in firm value within each pool that is given the same price by the market maker; it is not the increase in the *average* value of the firms which is the direct consequence of higher investment but which is shared with uninformed investors. Moreover, the informed investors must be patient enough to hold the shares until next period, when the information is revealed. In arguably marginal cases, there will be no social benefit from monitoring; in general, monitoring will provide a partial solution to the underinvestment problem.

The model shows that if a firm that has valid investment project and decides to pay high dividends rather than undertake the project informed investors will tend to sell their shares in the firm. At the same time firms that pay low dividends and invest will attract informed investors. Thus the relationship between dividends and informed/ institutional investor ownership runs in the opposite direction compared to the mechanism in Allen, Bernardo and Welch (2000). Countervailing effects of this type may explain the *weakly negative* relationship found empirically by Grinstein and Michaely (2005).

3.4 Alternative Mechanisms: Activist Shareholders and Repurchases

A final remark is in order. The paper has focused on managerial incentives and their effects on payout policy. It seems natural to ask whether managers' incentives could be altered so as to generate higher investment. It turns out that the answer to the problem is neither as simple nor as optimistic as one may think.

The managerial incentives can be adjusted by altering managerial compensation. The decisions in this area are made by existing shareholders - or by their representatives on the board of directors. Depending on their time horizon, existing shareholders may often be unwilling to promote higher investment under asymmetric information.

One can think of an existing shareholder as being faced with possible liquidity shocks in the future - or having to sell shares in the case of any other contingent event. That particular shareholder will be interested in the share price at the time where the sale occurs. If the probability of having to sell shares at time t is p_t, then then the shareholder will maximize the payoff function

$$\text{Payoff}^{shareholder} = p_1 P_1 + p_2(P_2 + Div_1) + p_3(P_3 + Div_1 + Div_2) + ...$$

where $\sum p_t = 1$.

This payoff structure is similar to that of managers, which was, as we have seen,

$$\text{Payoff} = P_1 + mP_2 + m^2 P_3 + ...$$

Thus it may well be that the managers' incentives are aligned with those of the "average shareholder", depending on shareholders' ability to tailor managerial compensation. Variations are of course possible and they can be examined within the framework of the model. One may even envisage the situation when managers are more investment-friendly than the average shareholder (in our model this attitude is actually beneficial from a social point of view, given that investment is positive NPV in our model) - while at the same time both groups of firm insiders may be far from following the "social" optimum. Of course, if the shareholders are expect to hold their shares for a long time, they can adjust the managers' compensation so as to reduce the loss of investment. Summing up, shareholder involvement can provide a partial solution to the underinvestment problem if shareholders are sufficiently patient.

Repurchases also have some potential to alleviate the problems caused by asymmetric information.

To understand how that can work, let us first consider the case without informed investors (when the quality of information is uniform across investors). Intuitively, one may be tempted to think that investing firms will want to repurchase shares since they are the ones that are underpriced. One should remember, however, that "bad" and "good" firms have the same amount of cash available. This distinguishes our model from those in the style of John and Williams (1985) - in our case uncertainty is connected with investment opportunities rather than directly with cash flows. As a result, the overpriced firm can always place a buy order for the same number of shares as the underpriced one, and investors are none the wiser.

There is one additional consideration, however, which may suggest the way in which repurchases can be useful. Unlike the usual market transactions, repurchases at the less-than-efficient price lead to transfers of wealth *among* old shareholders, rather than between old shareholders and new investors. In the case of underpriced firms, it is the tendering shareholders who lose - they are

disposing of their assets at a price below the true value. In the case of overpriced firms, it is the remaining, long-term shareholders who are losing out. Thus the difference between underpriced and overpriced firms is that in the latter case the aggrieved party stays with the firm. Even if they cannot control the managers ex ante (since they do not know the firm's investment opportunities), remaining shareholders could punish the managers for choosing repurchases ex post, when the information about the true quality of the firm is revealed[9].

The mechanism described above implies that the managers of low-quality firms may be less willing to use repurchases even if they afford them. This happens even if initially the shareholders of both types of firms are just as "patient". We can therefore understand why young firms with significant growth opportunities prefer repurchases to dividends for a given amount of free cash flow. The higher quality of firms using repurchases also explains why institutional investors seem to prefer them (Grinstein and Michaely 2005).

Introducing informed investors *and* repurchases brings some new elements without radically changing the problem. Suppose first that the repurchase is made public (observable). Then the informed investor will want to tender the shares she holds in the overpriced firm. The uninformed investors, however, will *not* tender. This is because they cannot distinguish between the overpriced and the underpriced firms. By tendering they will make a loss in the latter case and share the profits of the former with the informed investors, thus making a loss on average[10]. As a result, if shareholders tender, they can only be informed and the market maker will fully adjust prices to reflect the true quality of each firm type. This will however destroy the investors' incentives to become informed in the first place. Thus unreported open-market repurchases (which are the overwhelming majority of repurchases in the US, for instance) may be more helpful by providing informed investors better "camouflage" for their orders.

3.5 Summary and Conclusions

The paper has outlined a model that examines the managers' dividend and investment decision when firms have different investment opportunities and these investment opportunities are not observable by at least some of the investors. Unlike in Miller and Modigliani (1961), the dividend and investment decisions are given equivalent importance and are made together - as seems to be the practice of "real-life" managers (Lintner 1956, Brav et al. 1956). Managers are not a mere representative of the average shareholder and may have their own, rather distinct, objectives.

The results of the model can help explain the existence of partial dividend payments (DeAngelo and DeAngelo 2006) even if overall dividends do broadly fulfil their role in reducing agency problems. One may also be better equipped to explain the waves of "disappearing" and "reappearing"

[9]Shareholders can obviously create a reputation for punishing devious managers by playing the game repeatedly. They can fire managers if the share price declines after a significant repurchase program.

[10]The results and intuition are the same as in the model in Brennan and Thakor (1990), although their market model is different.

dividends, and to understand the debate between supporters of the catering explanation and those of idiosyncratic risk. Moreover, one can understand the limits of arbitrage by (existing or potential) informed minority shareholders and the factors that influence the relationship between dividends and informed shareholdings. The findings of the paper also shed some light on the distinctive qualities of dividends and repurchases.

3.1 Appendix

Proof of Proposition 1

Supposing that firms that have investment opportunities invest with probability p, the price at $t = 1$ will be:

- for firms that decide to invest and pay an initial dividend d:

$$P_1^d = d + \delta \frac{\beta p D' + \alpha d}{\beta p + \alpha} + \delta^2 \frac{C}{1-\delta}.$$

- for firms that decide not to invest and pay a high dividend DIn the case of a firm that pays D:

$$P_1^D = D + \delta \frac{\beta(1-p)d + \alpha D}{\beta(1-p) + \alpha} + \delta^2 \frac{C}{1-\delta}.$$

At $t = 2$, the cash flow from investment is realized and prices are adjusted accordingly. The shares of firms that have invested at $t = 1$ will have a cum dividend price equal to

$$P_2^d = D' + \delta \frac{C}{1-\delta},$$

while the shares of firms that have not invested will be valued at

$$P_2^D = d + \delta \frac{C}{1-\delta}.$$

From $t = 3$ onwards, the price will be equal to $\frac{C}{(1-\delta)}$. (This is the price as seen from $t = 1$, by either the investors or the managers. It is assumed that managers do not have significantly better information than outside investors for the very long run.)

Given that the manager's payoff function is given by the discounted sum of future bonuses,

$$\text{Payoff} = P_1 + mP_2 + m^2 \frac{C}{(1-m)(1-\delta)}.$$

the payoff for the managers of firms that decide to invest will be given by

$$\text{Payoff}^d = d + \delta \frac{\beta p D' + \alpha d}{\beta p + \alpha} + \delta^2 \frac{C}{1-\delta} + mD' + m\delta \frac{C}{1-\delta} + m^2 \frac{C}{(1-m)(1-\delta)},$$

while the payoff for firms that decide not to invest is given by

$$\text{Payoff}^D = D + \delta \frac{\beta(1-p)d + \alpha D}{\beta(1-p) + \alpha} + \delta^2 \frac{C}{1-\delta} + md + m\delta \frac{C}{1-\delta} + m^2 \frac{C}{(1-m)(1-\delta)}.$$

In a mixed strategy equilibrium (where managers of firms with investment opportunities decide to invest with probability p), Payoff^d = Payoff^D. That is, if one defines

$$H \equiv \text{Payoff}^d - \text{Payoff}^D = d + \delta\frac{\beta pD' + \alpha d}{\beta d + \alpha} + mD' - D - \delta\frac{\beta(1-p)d + \alpha D}{\beta(1-p) + \alpha} - md,$$

in a mixed strategy equilibrium $H = 0$. The pure-strategy equilibria can be characterized as follows:

- full investment if $H(p = 1) \geq 0$;
- no investment if $H(p = 0) \leq 0$.

H provides a measure of incentives to invest - the higher H, the higher the probability of investment. It can easily be checked that $\partial H/\partial k > 0$ (where $k \equiv D'/D$), $\partial H/\partial m > 0$, and $\partial H/\partial\beta > 0$.

Proof of Propositions 2 and 3

The structure of possible equilibria is given by the solutions of the equation $H(p) = 0$. In order to describe these solutions, it is convenient to check the monotonicity of $H(p)$ and hence to look for the roots of $H'(p) = 0$. Normalizing $d = 0$ and $D'/D = k$, the latter equation is equivalent to

$$\beta^2p^2(k-1) - 2\beta p(\beta k + \alpha k + \alpha) + k\alpha^2 + k\beta^2 + 2\alpha\beta h - \alpha^2 = 0.$$

where the roots are $p_{1,2} = \frac{\beta k+\alpha k+\alpha\pm\sqrt{k}}{\beta(k-1)}$. The higher root is always larger than 1; the lower root is positive, and can take values either below 1 if returns are relatively low (if $k < (\frac{1-\alpha}{\alpha})^2$) or above 1 if returns are relatively high (if $k > (\frac{1-\alpha}{\alpha})^2$).

If $k > (\frac{1-\alpha}{\alpha})^2$, H is increasing in p over the interval $[0, 1]$. If $k < (\frac{1-\alpha}{\alpha})^2$, H is increasing up to p_1 (with $H(p_1) = D(mk - 1 + \delta\frac{(1-\alpha)k\sqrt{k}+k(1-\alpha)-\alpha\sqrt{k}+\alpha}{\sqrt{k}-1})$), and then decreasing.

We also have that $H(1) = d - D + m(D' - d) + \delta\frac{\beta D'+\alpha d}{\beta+\alpha} - \delta D$ (which simplifies to $H(1) = D(mk - 1 + \delta\frac{\beta k}{\alpha+\beta} - \delta)$ if $d = 0$ and $D'/D = k$), and $H(0) = d - D + m(D' - d) + \delta d - \delta\frac{\beta d+\alpha D}{\alpha+\beta}$ (taking $d = 0$ and $D'/D = k$, $H(0) = D(mk - 1 - \delta\frac{\alpha}{\alpha+\beta})$). It can easily be seen that $H(1) > H(0)$ regardless of parameter values.

We now have the necessary elements to describe the equilibria in our model. If $k > \left(1 + \frac{\beta}{\alpha}\right)^2$, then

- If

$$k\Big(\frac{\delta\beta}{\beta+\alpha} + m\Big) > 1 + \delta$$
$$mk < 1 + \frac{\alpha\delta}{\alpha+\beta}$$

there is a mixed strategy equilibrium with partial investment, as well as the equilibrium of full investment ($H(1) > 0$, $H(0) < 0$). The mixed strategy equilibrium is however unstable.

- If

$$k\Big(\frac{\delta\beta}{\beta+\alpha}+m\Big) > 1+\delta$$
$$mk > 1+\frac{\alpha\delta}{\alpha+\beta}$$

there is only a pure strategy equilibrium (always invest; ($H(1) > 0$, $H(0) > 0$)).

If $k < (1+\frac{\beta}{\alpha})^2$:

- If

$$k\Big(\frac{\delta\beta}{\beta+\alpha}+m\Big) > 1+\delta$$
$$mk > 1+\frac{\alpha\delta}{\alpha+\beta}$$

there is only one pure strategy equilibrium (always invest; ($H(1) > 0$, $H(0) > 0$).

- If

$$k\Big(\frac{\delta\beta}{\beta+\alpha}+m\Big) > 1+\delta$$
$$mk < 1+\frac{\alpha\delta}{\alpha+\beta}$$

one can have both pure strategy equilibria (always invest and never invest), and an unstable mixed strategy equilibrium with partial investment ($H(1) > 0$, $H(0) < 0$).

- If

$$k\Big(\frac{\delta\beta}{\beta+\alpha}+m\Big) < 1+\delta$$
$$mk < 1+\frac{\alpha\delta}{\alpha+\beta}$$

and $H(p = \frac{\beta k+\alpha k+\alpha-\sqrt{k}}{\beta(k-1)}) > 0$, then there are two mixed strategy equilibria, as well as the pure strategy equilibrium of no investment (which gives the manager a lower expected payoff than either of the mixed equilibria with partial investment; $H(1) < 0$, $H(0) < 0$).

Proof of Proposition 4

We can use the implicit function theorem. We know that $H = 0$ for the mixed strategy equilibrium. As a result we have $\frac{\partial p}{\partial k} = -\frac{\frac{\partial H}{\partial p}}{\frac{\partial H}{\partial k}}$, $\frac{\partial p}{\partial m} = -\frac{\frac{\partial H}{\partial p}}{\frac{\partial H}{\partial m}}$, $\frac{\partial p}{\partial \beta} = -\frac{\frac{\partial H}{\partial p}}{\frac{\partial H}{\partial \beta}}$. It is easy to show that

$\frac{\partial H}{\partial k}$, $\frac{\partial H}{\partial m}$ and $\frac{\partial H}{\partial \beta}$ are always positive. Moreover, we have $\frac{\partial H}{\partial p} < 0$ in the stable mixed strategy equilibrium. As a result, we have $\partial p/\partial k > 0$, $\partial p/\partial m > 0$ and $\partial p/\partial \beta > 0$.

Proof of Proposition 5

The possible market prices for high-dividend firms are

$$\begin{aligned}
P_1^A =& D + \delta \frac{\frac{1}{2}q\alpha D + \frac{1}{2}q\beta(1-p)d}{\frac{1}{2}q\alpha + \frac{1}{2}q\beta(1-p)} + \delta^2 \frac{C}{1-\delta} \\
P_1^B =& D + \frac{\frac{1}{2}(1-q)\alpha D + \frac{1}{2}(1-q)\beta(1-p)d}{\frac{1}{2}(1-q)\alpha + \frac{1}{2}(1-q)\beta(1-p)} + \delta^2 \frac{C}{1-\delta} \\
P_1^C =& D + \delta D + \delta^2 \frac{C}{1-\delta} \\
P_1^D =& D + \frac{\frac{1}{2}(1-q)\beta(1-p)d + \frac{1}{2}(1-q)\alpha D}{\frac{1}{2}(1-q)\beta(1-p) + \frac{1}{2}(1-q)\alpha} + \delta^2 \frac{C}{1-\delta} \\
P_1^E =& D + \delta d + \delta^2 \frac{C}{1-\delta}
\end{aligned}$$

The informed investor's trading profits from monitoring high-dividend firms are

$$\begin{aligned}
\Pi^{high} &= \frac{1}{2}\phi(1-x)\delta(P_1^A - P^{noinvest_0})\frac{1}{2}\beta(1-p)q + \frac{1}{2}\phi(1-x)\delta(P^{high_0} - P_1^A)\frac{1}{2}\alpha q \\
&= \frac{1}{2}\phi(1-x)\delta\alpha\beta(1-p)q\frac{D-d}{\beta(1-p)+\alpha}
\end{aligned}$$

The cost of monitoring high-dividend firms is:

$$\text{Cost}^{low} = cq(\alpha + \beta(1-p))$$

As a result, net profits are

$$\Pi_{net}^{low} = \frac{1}{2}\phi(1-x)\delta\alpha\beta(1-p)q\frac{D-d}{\beta(1-p)+\alpha} - cq(\alpha+\beta(1-p))$$

Monitoring is worthwhile if

$$\frac{1}{2}\phi(1-x)\delta\alpha\beta q\frac{D-d}{(\beta(1-p)+\alpha)^2} > c$$

A similar reasoning can be used for low-dividend firms. The possible market prices for low-dividend firms are:

$$
\begin{aligned}
Q_1^A &= d + \delta \frac{\frac{1}{2}\beta p s D' + \frac{1}{2}\alpha s d}{\frac{1}{2}\beta p s + \frac{1}{2}\alpha s} + \delta^2 \frac{C}{1-\delta} \\
Q_1^B &= d + \delta + \frac{\frac{1}{2}\beta p (1-s) D' + \frac{1}{2}\alpha (1-s) d}{\frac{1}{2}\beta p (1-s) + \frac{1}{2}\alpha (1-s)} + \delta^2 \frac{C}{1-\delta} \\
Q_1^C &= d + \delta D' + \delta^2 \frac{C}{1-\delta} \\
Q_1^D &= d + \delta \frac{\frac{1}{2}\beta p (1-s) D' + \frac{1}{2}\alpha (1-s) d}{\frac{1}{2}\beta p (1-s) + \frac{1}{2}\alpha (1-s)} + \delta^2 \frac{C}{1-\delta} \\
Q_1^E &= d + \delta d + \delta^2 \frac{C}{1-\delta}
\end{aligned}
$$

The trading profits from monitoring low-dividend firms, the cost of monitoring and net profits for the informed investors are:

$$
\begin{aligned}
\Pi^{low} &= \frac{1}{2}\phi(1-x)\delta(P^{invest_0} - Q_1^A)\frac{1}{2}\beta p s + \frac{1}{2}\phi(1-x)\delta(Q_1^A - P^{low_0})\frac{1}{2}\alpha s \\
&= \frac{1}{2}\phi(1-x)\delta\alpha\beta p s \frac{D'-d}{\beta p + \alpha} \\
\text{Cost}^{low} &= cs(\alpha + \beta p) \\
\Pi_{net}^{low} &= \frac{1}{2}\phi(1-x)\delta\alpha\beta p s \frac{D'-d}{\beta p + \alpha} - cs(\alpha + \beta p)
\end{aligned}
$$

Monitoring is worthwhile if

$$
\frac{1}{2}\phi(1-x)\delta\alpha\beta p \frac{D'-d}{(\beta p + \alpha)^2} > c.
$$

Firm type	Liquidity shock	Monitored	Uninformed investors	Informed investors	Order flow	Price
(No growth, high cash flows)	Yes: ½ α firms	Yes: ½ q α	-2u	+u	-u	P_1^A
		No: ½ (1-q) α	-2u	0	-2u	P_1^B
	No: ½ α	Yes: ½ q α	0	+u	+u	P_1^C
		No: ½ (1-q) α	0	0	0	P_1^D
(Growth, high dividend)	Yes: ½ (1-p) β	Yes: ½ (1-p) β q	-2u	-u	-3u	P_1^E
		No: ½ (1-p) β (1-q)	-2u	0	-2u	P_1^B
	No: ½ (1-p) β	Yes: ½ (1-p) β q	0	-u	-u	P_1^A
		No: ½ (1-p) β (1-q)	0	0	0	P_1^D
(Growth, low dividend)	Yes: ½ p β	Yes: ½ p β s	-2u	+u	-u	Q_1^A
		No: ½ p β (1-s)	-2u	0	-2u	Q_1^B
	No: ½ p β	Yes: ½ p β s	0	+u	+u	Q_1^C
		No: ½ p β (1-s)	0	0	0	Q_1^D
(No growth, low cash flows)	Yes: ½ α	Yes: ½ α s	-2u	-u	-3u	Q_1^E
		No: ½ α (1-s)	-2u	0	-2u	Q_1^B
	No: ½ α	Yes: ½ α s	0	-u	-u	Q_1^A
		No: ½ α (1-s)	0	0	0	Q_1^D

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